EXHIBIT 7

TO PLAINTIFF'S STATEMENT OF UNDISPUTED MATERIAL FACTS IN SUPPORT OF ITS MOTION FOR SUMMARY JUDGMENT AGAINST DEFENDANT ERIC MONCADA

Expert Report of Hendrik Bessembinder

In the matter of:

CFTC v Moncada (12-cv-8791, S.D.N.Y.)

I. QUALIFICATIONS

1. I hold the position of A. Blaine Huntsman Chaired Presidential Professor of Finance at the David Eccles School of Business of the University of Utah. I previously held faculty positions at Emory University, Arizona State University, and the University of Rochester. I have taught courses in Corporate Financial Management, International Finance, Financial Markets, and Futures and Options, in undergraduate, masters, and doctoral programs, as well as in customized non-degree settings. My research, which has consistently been published in the most prestigious peer-reviewed Finance journals, is comprised of studies of financial and commodity markets, including stock markets, bond markets, foreign exchange markets, futures markets, and energy markets. The majority of my published research focuses on aspects of trading, including market rules, trading strategies, trading costs, price impacts of trades, order submission strategies, market liquidity, etc.

2. I hold a Ph.D. in Business from the University of Washington, with a major in Finance, and minors in Business Economics, Mathematics, and Research Methods. I serve as Managing Editor of the *Journal of Financial and Quantitative Analysis*, and as Associate Editor of the *Journal of Financial Economics* and the *Journal of Financial Markets*. I am former Associate Editor of the *Journal of Finance*. In addition to my academic duties, I have served as a consultant on issues related to financial and commodity markets for private and government clients, including the Finance Industry Regulatory Authority (FINRA), the New York Stock Exchange, the United States Department of Justice, the United States Commodity Futures Trading Commission, the United States Securities and Exchange Commission, the Attorneys

General of the States of New York and California, Interactive Data Corporation, and Goldman Sachs, Inc., among others. My resume is attached as Appendix A. Appendix B contains a complete listing of my previous testimony in trial or deposition.

II. INTRODUCTION AND SUMMARY OF FINDINGS

3. Eric Moncada ("Moncada"), while affiliated with BES Capital LLC ("BES") and Serdika LLC ("Serdika"), entered a number of "large lot" buy and sell orders (defined for this report as orders for two hundred or more contracts) in December 2009 wheat futures contracts traded on the Kansas City Board of Trade ("KCBT") and the Chicago Board of Trade ("CBOT"). The formal complaint filed by the U.S. Commodity Futures Trading Commission ("CFTC") in this matter focuses on Moncada's activity in the CBOT during eight specific days during October 2009, which I will refer to as the "charge dates."[1] Moncada submitted 710 large lot orders on the CBOT and 512 large lot orders on the KCBT on the eight charge dates. The CFTC has asked me to study various aspects of these orders, and to assess their impact on the December 2009 wheat futures market. To place the results in a broader context, I also examine a longer time period, and document that Moncada submitted a total of at least 2,351 large lot orders on the CBOT and 1,344 large lot orders on the KCBT for December 2009 wheat futures contracts.

4. My central conclusion, supported by the analyses described in the following sections, is that on the eight days charged, as well as during the broader time period I examined, Moncada did not enter the large lot orders with the intention that they would generate trades. The evidence instead strongly supports the conclusion that he entered the large lot orders with the intent to alter market conditions in advance of trades in the opposite direction. That is, he intended to and did sell wheat contracts after he entered large buy orders, and he intended to and

[1] The charge dates are October 6, 12, 14, 19, 26, 27, 29, and 30, 2009.

did purchase wheat contracts after he entered large sell orders. Further, the evidence indicates that his large lot orders adversely affected the wheat futures market. More specifically, I find that:

(i) On the eight charge dates, over 470,000 orders were entered for the December 2009 CBOT wheat futures contract, but only 853 (0.18% of total) were large lots. Further, 710 of these large lot orders were entered by Moncada, while all other market participants combined entered only 143 large lot orders. The broader period that I studied included 3,259 large lot orders, 2,351 of which were submitted by Moncada.

(ii) Moncada cancelled most of his large lot orders, and did so very quickly, as compared either to other market participants who submitted large lot orders or to Moncada's own small lot orders. On the eight charge dates Moncada canceled 99.6% of the large lot orders he entered on the CBOT. By comparison, other market participants canceled only 28.7% of their large lot orders, and Moncada canceled 51.5% of his small lot orders. Moncada canceled his large lot orders on charge dates an average of only 2.1 seconds after entry, and 92.5% of his large lot order cancelations occurred within five seconds of entry. By comparison, other participants who entered and canceled large lot orders on the charge dates did so after an average of 127 minutes, and only 4% were canceled within five seconds. The broader time period I studied provides results similar to the eight charge dates, in that Moncada canceled a large percentage of his orders (99.6%), and did so quickly (within 4.6 seconds, on average).

(iii) Moncada selected limit prices to match the best bid or offer ("BBO") for more than three quarters of his large CBOT orders on the charge dates and also in the broader time period, and he selected a limit price within 10 ticks of the BBO for all of his large lot orders on the charge dates and 99.9% of his large lot orders in the broader sample. Related, while Moncada had the option to hide some of his order size by use of "Iceberg" orders, he used this option for less than 1% of his large lot

orders. These choices ensured that Moncada's large lot orders were (briefly, before they were canceled) fully visible to other CBOT market participants, including computerized trading algorithms.

(iv) Moncada's large lot orders generated very few actual trades. On the eight charge dates only 14.4% of Moncada's large lot CBOT orders generated any trades at all, and among those that generated some trades, an average of only 1.1% of the order size was executed. By comparison, large lot orders submitted by other CBOT participants on the charge dates led to some trades 92.3% of the time, and among those that generated some trades, an average of 45.2% of the order size was executed. Results for the broader time period are similar, in that only 12.1% of Moncada's large lot CBOT orders generated any trades at all, and among those that generated some trades, an average of only 0.9% of the order size was executed.

(v) Moncada's actual trades were systematically in the *opposite* direction of his large lot orders. That is, he on balance purchased wheat futures contracts after submitting large sell orders and he sold wheat futures contracts after submitting large buy orders. Focusing on the eight charge dates, for each 1000 contracts in large lot orders entered, Moncada subsequently traded in the opposite direction an average of 7 contracts within two minutes, 38 contracts within ten minutes, 78 contracts within thirty minutes, and 107 contracts within sixty minutes. The same general pattern appears in the broader data sample, where for each 1000 contracts in large lot orders entered, Moncada subsequently traded in the opposite direction an average of 8 contracts within two minutes, 25 contracts within ten minutes, 48 contracts within thirty minutes, and 67 contracts within sixty minutes.

(vi) Moncada's large lot orders affected the wheat futures markets on the eight charge dates as well as in the broader period studied. On average wheat prices moved (increasing with buy orders and decreasing with sell orders), bid-ask spreads widened, market volatility increased, and the rate of order entry by other traders was altered when he entered his large lot orders.

5. These opinions are based on my analysis of the data provided to me and described in the following section. I respectfully reserve the right to update and amend my report should more information become available prior to trial.

III. A COMPARISON OF MONCADA'S LARGE LOT ORDERS

III. A. The Available Data

6. I examined four main datasets to study Moncada's large lot orders in the December 2009 wheat futures contract. The first is comprised of CBOT audit trail data for the December 2009 contract, including all trading days during the calendar interval August 13, 2009 to November 30, 2009.[2] I will refer to this dataset as the "CBOT Audit Data." The second is comprised of KCBT audit trail data for all trading days from August 31 to November 29, 2009. I will refer to this dataset as the "KCBT Audit Data."[3] The third is a continuous record of best bid and offer ("BBO") prices for the December 2009 CBOT wheat futures contract, from August 1 to November 30, 2009.[4] I will refer to this dataset as the "CBOT BBO data." The fourth is a set of records generated by the Futures Commission Merchant that handled Moncada's orders. This dataset contains message traffic related to December 2009 wheat futures orders by BES and

[2] Orders are identified in the CME data by a variable labeled "Order_AT". I exclude from my analysis a small proportion (0.48% of total) of records where the Order_AT variable was not uniquely assigned within a trading day.
[3] The CME and KCBT audit data contain a trader identification variable named "Tag50". Moncada's records are identified in the data by a Tag50 observation equal to "EM4".
[4] This data is provided by the Chicago Mercantile Exchange, owner of the CBOT. See http://www.cmegroup.com/market-data/datamine-historical-data/topofbook.html.

Serdika, for portions of the period August 25 to November 23, 2009.[5] I will refer to this dataset as the "FCM log files." For this analysis I focus on day limit orders, which account for over 98% of all order observations, and all of Moncada's orders.

III.B. Moncada's Large Lot Order Entry and Execution Rates

7. Table 1 contains a compilation, based on the CBOT and KCBT Audit data, of Moncada's large order submissions, as well as trades executed against those large lot orders, on a daily basis. On the eight charge dates Moncada entered 710 large lot orders for 275,000 contracts on the CBOT and 512 large lot orders for 220,000 contracts on the KCBT. In the broader period I studied Moncada entered 2,351 large lot orders for a total of 989,000 contracts on the CBOT and 1,344 large lot orders for a total of 601,000 contracts on the KCBT.

8. Moncada executed relatively few trades with these large lot orders. Total executions on his charge date CBOT large lot orders amounted to 2,136 contracts, or 0.78% of the total entered. Executions on his charge date KCBT large lot orders totaled only 280 contracts, or 0.13% of the total entered. In the broader period I studied, total executions on his large lot CBOT orders amounted to 6,053 contracts, or 0.61% of the total entered, while executions on his large log KCBT orders were only 623 contracts, or 0.10% of the total entered.

9. At various times Moncada entered large lot orders both to buy and to sell December 2009 wheat futures. Of the 2,351 large lot orders entered on the CBOT, 1,476 were buy orders and 875 were sell orders. Of the 1,344 large lot orders entered on the KCBT, 1,132

[5] The log file data do not comprise a complete representation of Moncada order submissions during the time interval of interest. First, the data were sent to me in the form of daily files, several of which contained exactly 65,545 records. It appears that those days which generated a greater number of records were truncated. Second, the range of calendar dates was not exhaustive. I received log file data for BES for trading days during the calendar interval August 25 to November 6, 2009, excluding October 8, 16, 20, 21, 22, and 30, as well as November 4 and 5. I received log file data for Serdika for trading days during the calendar interval October 5, 2009 to November 23, 2009, except for October 8, 15, and 20, as well as November 11, 17, 18, and 19.

were buy orders and 232 were sell orders. I study Moncada's combined buying and selling activity, since the relevant economic theories apply to both buy and sell orders.

10. Table 2 reports on total order entries and trade executions in the December 2009 CBOT wheat futures contract, for Moncada as well as other market participants, for both large lot and "small lot" (size of less than 200 contracts) orders. Several facts are noteworthy. First, over 85% of the contract size entered by Moncada was in the form of large lot orders, but only 10.7% of the contracts traded by Moncada were associated with those large lot orders. Second, the bulk of the large lot orders entered on the CBOT were entered by Moncada. He entered large lot orders for a total of over 989,000 contracts, while all other market participants combined entered large lot orders for only 338,000 contracts. Third, despite the fact that he accounted for almost 75% of the contracts entered through large lot orders, Moncada's executions of 6,053 contracts against his large lot orders amounted to only 6.1% of the CBOT total of executions against large lot orders.

III.C Moncada's Cancelations of his Large Lot orders

11. Table 3 presents evidence regarding Moncada's cancelation strategies on his large lot CBOT orders. For purposes of comparison I also present data on the cancelation strategies of other participants who submitted large lot orders and the strategies followed by Moncada himself for his small lot orders. Most notably, Moncada canceled virtually all (99.6%) of his large CBOT orders, on the charge dates as well as in the broader period. His average time from entry to cancelation was only 2.1 seconds on the charge dates, and 4.6 seconds in the broader period. Moncada's cancelations of his large lot orders occurred within five seconds for 92.5% of orders submitted on charge dates and 94.9% of orders in the broader period studied.

12. Table 4 presents corresponding evidence for Moncada's large lot orders on the KCBT. Here, he canceled his orders within an average of 1 second on the eight charge dates and also in the broader sample. These orders were canceled within five seconds over 98% of the time. Notably, other market participants submitted only two large lot orders on the KCBT during the period studied.

13. In most cases the comparisons of Moncada's large order outcomes to those of other market participants and to his own small lot orders are so dramatic that it is intuitively obvious that the divergences could not represent random, or chance, outcomes. Nevertheless, I report for many of these comparisons, as well as for other tests contained in this report, a formal "probability value," or "p-value" for short.

14. The p-value is used to determine if a given finding in the data could have arisen purely by random chance. All data samples contain some randomness. As a consequence, even if the true value of a given measure (e.g. the difference between Moncada's mean time to cancelation and other market participants' mean time to cancelation) is zero, the estimate of the measure obtained from a sample will not be exactly equal to zero. The p-value is the probability of observing in the data a divergence from zero as large as or larger than that actually observed, if the true divergence is zero. A low p-value indicates a small probability that the observed divergences occurred randomly, and a corresponding high probability that a true divergence exists. In most cases the p-values associated with the comparisons in this report are less than 0.1%.

15. Moncada's rapid cancelations of most of his large lot orders stands in contrast to the behavior of other market participants who submitted large lot orders. On the eight charge dates, other participants canceled only 28.7% of their large lot CBOT orders. When they

canceled, it was after an average of 127 minutes.[6] Only 3.6% of other participants' large lot orders on the charge dates were canceled with five seconds. In the broader period other traders canceled 36.0% of their large lot orders, and the cancelations took place after an average of 73 minutes. Clearly, Moncada canceled his large lot orders much more frequently and much more rapidly than other CBOT traders, on the charge dates as well as during the broader time period I studied.

16. Moncada's cancelations of his large lot orders can also be contrasted to his own behavior when he submitted small lot orders. On the eight charge dates he canceled 51.5% of his small lot CBOT orders, and allowed them to stand for an average of 10 minutes before canceling. In the broader sample he canceled slightly less than half (48.6%) of his small lot CBOT orders, and allowed the small lot orders to stand for an average of eleven minutes before canceling.

17. I conclude that Moncada canceled a very high proportion of his large lot orders, and did so very rapidly, as compared either to other CBOT participants who submitted large orders, or to his own behavior when he submitted small lot orders. This conclusion applies for the eight charge dates, as well as for the broader period studied.

[6] The audit data available to me did not provide sufficient information to track individual orders as they were modified. In particular, the "Order_AT" variable in the CME Audit data and the "TON" (for trade order number) variable in the KCBT Audit data were updated each time an order was modified. However, the data does link trade executions and cancelations to the most recent modifications or, if a given order was not modified, to the order entry. Hence the elapsed time data I report pertains to time since entry or the most recent modification, whichever is less. Moncada's large orders were generally not modified, while his small orders and the orders of other market participants very often were. The net effect is that the elapsed time data that I compute for other market participants and for Moncada's small lot orders *understates* the true elapsed time from order entry. As a consequence, the extent to which Moncada cancels his large orders more quickly than others and more quickly than his small lot orders is also *understated*.

III.D. Trades executed against Moncada's Orders

18. In Table 5, I report on the CBOT trade executions associated with large and small lot orders entered by Moncada and by other CBOT traders. Focusing on the eight charge dates, only 14.4% of Moncada's large lot orders led to any trades at all. By comparison, 92.3% of the large lot orders entered by other traders led to at least some trades. Also, 51.6% of Moncada's small lot orders led to at least some trades.

19. Among the charge date orders that did generate trades, Moncada's large lot orders had notably low execution rates, as only 1.1% of the order size was executed, on average. By comparison, Moncada executed 45.5% of the total size of his small lot orders, and other traders who submitted large lot orders executed 45.2% of their total order size, on average.

20. Moncada's large lot orders on charge dates that did execute (at least in part) did so quickly. The average time from submission to the first trade was 0.5 seconds for Moncada's large lot orders. By comparison, the average elapsed time to first trade was 26.8 minutes for large lot orders submitted by others. For Moncada's small lot orders the average elapsed time to first trade was 4.2 minutes.

21. Similar conclusions apply for Moncada's CBOT executions in the broader sample. Here too we can observe that only a small percentage (12.1%) of Moncada's large lot orders generated any trades. Further, among those that generated some trades, only a very small amount of the total size (0.9%) was executed, and the executions began quickly (16.5 seconds on average).[7] Each of these statistics differs substantially from outcomes for large lot orders submitted by others and for small lot orders submitted by Moncada.

[7] This figure is affected by one outlier, a 200 contract order that executed after 73 minutes. Excluding this unusual observation, the average time from submission to first execution was just 1.2 seconds for Moncada's large lot orders that generated trades.

22. Comparing Moncada's small lot orders to the small lot orders submitted by others also leads to certain insights. Focusing on the eight charge dates, a higher proportion of Moncada's small lot orders (51.6% vs. 29.0%) led to trades, and among those orders that led to trades a higher percentage (45.5% vs. 28.2%) of Moncada's order size was executed. In the broader time period as well, a higher percentage of Moncada's small lot orders led to trades and among those that generated trades a higher percentage of Moncada's small lot orders were executed, as compared to other traders. I conclude for the eight days charged, as well as the broader time period, that Moncada's motivation for submitting large lot orders cannot be that he was less successful than other CBOT traders in obtaining executions with his small lot orders.[8]

III.E. The Visibility of Moncada's Large lot orders and their Low Execution Rates

23. Table 6 provides data regarding limit prices in comparison to the best bid and offer ("BBO") quotes for orders submitted and modified on the CBOT. For each order entry or modification, I compare the limit price to the CBOT BBO data prevailing at the time, as follows. For buy orders, I compute the distance to the BBO as the best bid quote less the limit price. For sell orders, the distance to the BBO is the limit price minus the best ask quote. I measure this

[8] I also examined eight days on which Moncada submitted small lot orders, but did not submit large lot orders, on the CBOT. The dates were August 17, August 28, September 4, September 9, October 20, October 21, October 22, and November 2, 2009. He submitted only 465 small lot orders (58 per day) on these occasions, compared to 24,565 small lot orders (430 per day) on the days where he also submitted large lot orders. Although the smaller sample size precludes statistical significance, I find that on these days also Moncada obtained at least partial execution for a larger percentage of his orders, and that the orders that generated executions did so more quickly, as compared to other traders' small lot orders. Among small lot orders that generated trades on these dates Moncada's execution as a percentage of order size was almost identical to that of other traders. Hence the evidence supports the conclusion that Moncada was more successful that other traders in obtaining executions on his small lot orders even on days when he submitted no large lot orders.

distance in "ticks", where a tick is one quarter of a cent per bushel, the minimum allowable price increment for CBOT wheat futures contracts.[9]

24. Moncada's large lot orders were entered with limit prices that matched the BBO in the majority (77.1% on the charge dates and 77.3% in the broader sample) of cases. On average, his large lot orders had limit prices only 0.2 ticks from the BBO on charge dates and 0.1 ticks from the BBO in the broader sample. All of his large lot orders on the charge dates, and virtually all (99.9%) in the broader period had limit prices within 10 ticks of the BBO. By comparison, other traders' large lot orders were placed further from the BBO (18.0 ticks on the charge dates and 13.9 ticks in the broader sample), on average. Further, Moncada priced his small lot orders less aggressively (6.6 ticks to the BBO on the charge dates and 6.7 ticks to the BBO in the broader period) on average.

25. Market participants on the CBOT have the option to use "Iceberg" orders, which display to other traders only a small portion of the actual order size. The FCM log files contain a field that indicates whether the "iceberg" function was used on each order. Table 7 reports on the frequency with which Moncada made use of the "iceberg" function, for orders entered manually and for orders entered using his "autospreader." Among orders entered manually, Moncada elected the "iceberg" option on 5.2% of small lot orders, but on only 0.6% of his large lot orders.

26. Moncada's large lot orders were fully visible to other market participants. In particular, the CBOT disseminates to its subscribers data on unexecuted limit orders within ten ticks of the BBO. Thus, Moncada's large lot orders were always priced so as to be visible to other market participants, including computer algorithms that monitor the market in real time.

[9] This "ticks to best" measure is negative for orders that improve (higher prices for buy orders or lower prices for sell orders) on the BBO.

Further, he virtually never used the "iceberg" option for his large lot orders. I conclude that Moncada entered his large lot orders on the charge dates as well as in the broader period in such a manner to ensure that their characteristics, including aggressive prices and uncommonly large sizes, were fully visible to other market participants.

27. Although Moncada most often canceled his orders quickly, they were visible long enough to generate responses from computer algorithms. Hasbrouck and Saar (2012) study order data for Nasdaq common stocks, and detect that computerized algorithms often respond to an event, such as the arrival of a new order, within about 2 to 3 milliseconds (two to three thousandths of a second).[10] The sample they studied was drawn from calendar years 2007 and 2008, implying that the technology for such rapid reactions was available to market participants during 2009 when Moncada entered the large lot orders at issue in this matter. By comparison, Kosinski (2009) surveys the literature on human reaction times, and reports that human reactions to even the simplest stimuli typically take about 200 milliseconds.[11]

28. Generally speaking, I would anticipate that large, aggressively priced, and fully visible orders would be associated with a large number of executed trades. This reflects that the aggressive prices are attractive to existing counterparties and that the exposure of the orders can attract new counterparties who did not already have orders in the book. Indeed, I have documented in another setting that aggressive prices and order exposure (i.e. the election to not use the "iceberg" option) are both typically associated with high execution rates.[12] It is therefore all the more striking that Moncada's large lot orders in the December 2009 wheat futures market

[10] Hasbrouck, J. and G. Saar, 2012, Low-Latency Trading, working paper, available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1695460. The authors define the reaction time as the time it takes to learn about an event, generate a response, and have the exchange act on the response.
[11] Kosinski, R., 2009, A literature review on reaction time, working paper, available at http://homepage.univie.ac.at/andreas.franz.reichelt/intro2cogsci2/data/literature_review_reaction_time.pdf.
[12] H. Bessembinder, M. Panayides, and K. Venkataraman, 2009, Hidden liquidity: An analysis of order exposure strategies in electronic stock markets, Journal of Financial Economics, 94, 361-383.

had extremely low execution rates. These low execution rates could not have been an accident. I conclude that Moncada undertook strategies, including quick cancelations, to ensure low execution rates on his large lot orders on the eight charge dates as well as during the broader period studied.

IV. MONCADA'S ACTUAL TRADES FOLLOWING LARGE ORDER SUBMISSION

29. The evidence summarized in the prior paragraphs indicates that Moncada most often canceled his large lot orders quickly, and only rarely executed trades with his large lot orders. This evidence is consistent with the reasoning that Moncada did not typically intend to execute trades with his large lot orders. However, Moncada submitted many small lot orders, and executed a large volume of trades with them. An obvious possibility is that he submitted the large lot orders with intent to alter market conditions to benefit trades to be executed with his small lot orders.

IV.A. Theories of Trading After Large Order Submission

30. At least two theories are potentially relevant to this matter. The first is the theory of "sunshine" trading.[13] The second is the theory of "spoofing".[14]

31. The theory of sunshine trading applies to an investor who is "uninformed" in the sense that she has no unique knowledge or insight regarding market fundamentals, but nevertheless wishes to complete a relatively large transaction. Consider, for example, a trader

[13] See, for example, Admati, A.R., and P. Pfleiderer, 1991, Sunshine trading and financial market equilibrium, Review of Financial Studies, Vol 4 (3), 443-481.
[14] See, for example, Hasbrouck J., and G. Saar, 2002, Limit Orders and Volatility in a Hybrid Market: The Island ECN", working paper, New York University, and Lee, E., K. Eom, and K. Park, 2013, Microstructure-based manipulation: Strategic behavior and performance of spoofing traders, Journal of Financial Markets, in press.

who wishes to make a large sale for liquidity purposes. The use of a sell order with a sufficiently low limit price would ensure that the order executed, but the order could "walk the book," creating an adverse price impact and a low average sale price.[15]

32. The sunshine trader makes a public announcement of her intent to transact, hoping to attract natural counterparties or potential liquidity suppliers who have not already posted orders in the limit order book. If the public announcement of the sale is successful it will attract additional buy orders to the limit order book, and the sale can be completed with smaller price impact. Since any price impact of an informationless trade would be temporary, the net effect of a successful sunshine trading strategy would be to reduce the extent to which prices would be pushed away from their longer term equilibrium, which is desirable from an economic perspective. It might be argued that Moncada's posting of large but fleeting orders is analogous to the sunshine trader's public announcement of a desire to trade.

33. The theory of spoofing focuses on traders who post orders in the opposite direction of their intended trade. Spoofing is regarded by academic authors as a manipulative tactic. For example, Hasbrouck and Saar (2002, page 24) write:

> "Another potential explanation for fleeting limit orders is a manipulative tactic known as 'spoofing'. To manipulate, a trader places a visible order in the opposite direction of the trade that is genuinely desired. For example, a seller might post a small buy order priced above the current bid, in hopes of convincing other buyers to match or outbid. If this occurs, the trader can sell into this (higher) price. It is necessary here that the order be visible."

34. Successful spoofing strategies would not be beneficial to market quality, since they potentially cause temporary price changes not associated with economic fundamentals. Further, they rely on misleading other traders as to the true reason the orders are posted.

[15] A large order "walks the book" by exhausting the quantity of resting limit orders at each successive price level, leading to a series of executions at progressively more extreme (higher for buy orders, lower for sell orders) prices.

IV.B. Distinguishing Between the Theories.

35. It is possible to assess which (if either) of the theories of sunshine trading and spoofing applies in this case by examining the direction of Moncada's actual trades after he posts large limit orders. Under the sunshine trading interpretation the large lot orders are placed to attract counterparties to facilitate trades in the *same* direction as the large lot orders. That is, large buy orders would be placed to attract new sell limit orders, such that a buy can subsequently be completed, and vice versa. In contrast, under the spoofing interpretation the large lot orders are placed to facilitate trading in the *opposite* direction as the large lot orders. That is, a large buy order would be placed in hopes inducing additional buy orders at higher prices, to facilitate completion of a sell order, and vice versa.

36. I compiled a record of Moncada's actual accumulated position in December 2009 wheat futures contracts, at ten second intervals, beginning at midnight on each trading day.[16] Completed purchases increased his accumulated position, and completed sales decreased his position. I considered both his outright position, obtained by adding his CBOT position and his KCBT position, as well as his CBOT-KCBT spread position, obtained by subtracting his KCBT position from his CBOT position.[17] A positive outright position benefits from increased overall wheat prices, and vice versa, while a positive spread position benefits from a wider differential between CBOT and KCBT wheat prices, and vice versa.

[16] My computation of Moncada's position differs from his actual position if he carried any position from the prior calendar day. The goal of this analysis is to distinguish between the sunshine trading and spoofing hypotheses. To distinguish between these requires that I measure Moncada's net trading, i.e. the *change* in his position, in the periods after he posts large orders. His position carried from the prior day is not required for this purpose.

[17] To illustrate, suppose that Moncada purchases 10 contracts on the CME and 10 contracts on the KCBT. His outright position increases by 20 contracts, while his spread position is unchanged. In contrast, suppose he purchases 10 contracts on the CME and sells 10 contracts on the KCBT. His outright position is unchanged, while his spread position increases by 20 contracts.

37. I also compiled a record of Moncada's newly entered large lot orders, at ten second intervals. In doing so, I counted buy orders as positive and sell orders as negative. If a given ten second interval includes both buy and sell orders I recorded the size of the buy orders minus the size of the sell orders. I compiled his outright order entry by summing order entries across the CBOT and the KCBT. I compiled his CBOT-KCBT spread order entry by subtracting his KCBT order entry from his CBOT order entry.[18]

38. To assess the relation between Moncada's large lot orders and his subsequent trades, I implement least squares regression analysis. Regression analysis is arguably the most widely used statistical technique in the field of Finance and Economics. It is used to assess the average statistical relationship between a so-called "dependent" variable and one or more explanatory variables.[19] In my implementation, the dependent variable is the change in Moncada's actual position over varying time intervals subsequent to his entry of large lot orders. The explanatory variable is the net quantity of large lot orders he entered (in thousands of contracts). Each variable is measured at ten second intervals. I study observations during normal daytime trading hours, 9:30 to 13:15 Central time. This period accounts for the bulk of market activity, and over 99% of Moncada's large lot orders were entered during these hours.

39. The results of this regression analysis are reported in Table 8. In addition to reporting coefficient estimates, which quantify the average change in actual positions associated with each 1000 contracts of large lot orders, I report a probability value (or "p-value") for each

[18] Moncada's large lot orders were not typically spread orders, in the sense that they did not typically involve simultaneous submissions of buy orders on one market and sell orders on the other. He did, however, engage in spread trading, so it is useful to assess both his outright positions and his net spread positions, to ensure that no important aspect of his trading is omitted.

[19] While it is typical to refer to the variable being explained as the "Dependent" variable, it is not necessary to presume causation from the explanatory variable to the dependent variable. In the present analysis it may be the case that causation actually runs from desired future trades to current submission of large orders. The regression analysis documents the magnitude of the statistical association between the dependent and explanatory variables, but does not, by itself, establish the direction of causation.

coefficient. As noted, the p-value represent the probability that the estimated coefficient could have arisen by random chance, even is the true coefficient is zero.[20] Panel A reports results estimated across all available data, and focuses on outright positions and orders, while Panel B reports full sample results focused on CBOT-KCBT spread positions and orders. Panels C and D report corresponding results estimated using data from only the eight charge dates.

40. The key result of this regression analysis can be stated succinctly. The negative coefficient estimates on Table 8 indicate that Moncada consistently completed trades in the *opposite* direction of his large lot orders, buying after he posted large sell orders and selling after he posted large buy orders.

41. The negative coefficients reported on Table 8 are largest when assessing trades over longer intervals of time. The p-values indicate that it is extremely unlikely that the estimated coefficients arose due to random chance, particularly at longer time horizons. The same general pattern, of negative coefficients that grow larger with longer time horizons, is observed for outright positions and orders, as well as for spread positions and orders. It exists in the full available sample, and in the subsample of eight charge dates.

42. The coefficient estimates reported on Table 8 indicate that Moncada traded substantial positions after posting large lot orders. Each coefficient indicates the average number of contracts traded per 1000 contracts of large lot orders entered. Focusing on Panel C, which pertains to outright trades and orders on the charge dates, the estimates indicate that within one minute of posting the large lot orders he had traded in the opposite direction an average of

[20] Computation of p-values for the regressions reported in Table 8 is made complicated by the fact that successive observations on the dependent variable overlap. For example, when the dependent variable is the position change over the next five minutes, the 12:00:00 observation measures changes from 12:00:00 to 12:05:00, while the following observation measures changes from 12:00:10 to 12:05:10. To obtain accurate p-values I implement the correction described in Newey and West (1987). See Newey, W. and K. West, 1987 "A Simple, Positive Semi-definite, Heteroskedasticity and Autocorrelation Consistent Covariance Matrix," Econometrica 55 (3): 703–708.

3.4 contracts. By five minutes subsequent he traded an average of 19.3 contracts in the opposite direction. Over twenty minutes he traded an average of 56.1 contracts the opposite direction as the large lot orders, and by the time an hour had elapsed he traded an average of 107.5 contracts in the opposite direction as the large lot orders.

43. Panel D of Table 8 reports results based on CBOT-KCBT spread rather than outright positions, on the charge dates. These results support the same conclusions. In particular, Moncada altered his net (CBOT minus KCBT) position in the opposite direction as his net (CBOT minus KCBT) large lot order entry. By sixty minutes after the large lot entry his spread position had changed by an average of 63 contracts, again in the opposite direction as his net large lot order entry.

44. The coefficients on Panel A of Table 8, which correspond to Panel C except that they consider the broader set of data rather than just the eight charge dates, indicate a similar pattern. In particular, Moncada traded an average of 67.5 contracts (per thousand large lot orders entered) in the opposite direction as the orders. Panel B contains corresponding results for CBOT-KCBT spread positions rather than outright positions, also shows a pattern of trading in the opposite direction after large order entry.

45. In short, my examination of Moncada's actual trades in the periods after he posted his large lot orders provides evidence that is strongly inconsistent, for the eight days charged, as well as the broader time period, with the sunshine trading interpretation, which would have predicted actual buys following the posting of large buy orders, and vice versa. Instead, the analysis provides evidence that is strongly supportive of the spoofing interpretation for Moncada's large lot orders, for the eight days charged, as well as the broader time period.

IV.C. Moncada's Reactions When His Large Lot Orders Did Execute

46. The high cancelation rates, low execution rates, aggressive prices, and lack of use of the "iceberg" function on Moncada's large lot orders, as well as the evidence of actual executions in the opposite direction as the large lot orders, are all consistent with the interpretation that Moncada intended for his large lot orders to be visible, but did not intend for them to execute. However, it may be difficult for even a skilled trader to consistently predict with precision the executions that will result from an order submission. The difficulties stem from a number of factors, including possible order submissions by other traders in the preceding milliseconds, the existence on the limit order book of "iceberg" orders previously submitted by other traders, as well as the CBOT's somewhat complex algorithms for allocating a completed trade across multiple orders with the same limit price.[21] In a few cases Moncada's large lot orders did execute fully or nearly so.

47. I searched the CBOT audit data to identify all cases where a Moncada order for more than 200 contracts generated executions of at least 99% of the order size. There were a total of eight such occurrences. Among these, four involved Moncada orders that executed against each other, in wash trades that generated little or no net position change.[22] The four remaining instances included a buy order for 409 contracts that was fully executed on September 22, 2009, a sell order for 202 contracts on which 200 contracts were executed before the order was cancelled on October 2, 2009, a buy order for 202 contracts that was fully executed on

[21] The KCBT did not allocate executions across orders based on simple price and time priority, but relied on complex algorithms. See, for example, http://www.cmegroup.com/confluence/display/EPICSANDBOX/Match+Algorithm+-+Split+FIFO+and+Pro-Rata.

[22] In particular, on October 15, 2009 Moncada entered near-simultaneous (within one second) buy and sell orders for 271 contracts, each with a price of $4.99, that largely executed against each other. On November 6, 2009 he entered near simultaneous (again within one second) buy and sell orders for 235 contracts, each with a price of $5.0625, that executed against each other. Table 9 contains a daily summary of Moncada's wash trades in the CBOT audit data.

October 12, 2009, and another buy order for 202 contracts that was fully executed on October 27, 2009.

48. For each of these four instances, I tracked Moncada's net position (his accumulated buy – sell trades since 12 AM) at ten second intervals before and after the large execution. These positions are displayed in Figures 1 to 4. For example, on September 22, 2009, Moncada's position (accumulated net trading since midnight) was 20 contracts just before the execution of a large buy order at (12:37:02) that increased his position to 437 contracts. Little more than a minute later (by 12:38:30) Moncada had reduced his position to 306 contracts. Twenty three minutes later (by 13:00:30) his position was reduced to 207 contracts. By market close (at 13:15:00) Moncada had reduced his position to 22 contracts, almost identical to his position prior to the large order execution.

49. For each of the four cases where a large Moncada order actually executed, Moncada quickly responded with offsetting trades to substantially eliminate the position obtained through the large execution. This evidence supports the interpretation that the few cases where large Moncada orders executed were accidental.

50. As noted, Moncada rarely used the available "iceberg" function when he entered his large lot orders. In my examination of Moncada's responses to the few cases where his large lot orders executed fully, I observed that he did submit (slightly smaller) "iceberg" orders at those times. To assess this issue more systematically, I searched the FCM log files and identified all instances where Moncada used the "iceberg" function on an order entry with size of 100 contracts or more. This occurred only forty times in the log file database. Interestingly, eight of these forty occurrences were in the immediate aftermath of the apparently unintended execution of a large lot orders. Table 10 summarizes these events.

51. On October 2, 2009, a sell order for 200 contracts executed at 10:35:26. Thereafter, Moncada submitted a series of four buy orders (three for one hundred contracts and one for 102 contracts) while using the "iceberg" function. Similarly, on October 27, 2009, a buy order for 202 contracts executed at 10:10:22. Thereafter, Moncada submitted a series of four sell orders (each for 100 contracts), while using the "iceberg" function.

52. Moncada rarely used the "iceberg" function for his large lot orders, thereby ensuring that they were fully visible, but he canceled most of his large lot orders before they could execute. In contrast, Moncada entered multiple orders that did use the "iceberg" function in the wake of the few cases where his large lot orders did execute. I have documented elsewhere that "iceberg" orders tend to be used by uninformed traders to mitigate adverse price movements, allowing execution at better prices.[23] Conversely, fully exposed orders tend to be associated with larger price movements.

53. The evidence here is consistent with the reasoning that Moncada did not typically use the "iceberg" option for his large lot orders, because he did not intend for them to execute. If the large orders were canceled rather than executed, he was not harmed by triggering a move in the price (i.e. an increase after entering buy orders and vice versa). Indeed, he would potentially have benefitted from such price movements if his intent was to trade in the opposite direction as the large lot orders. In contrast, when a couple of large lot orders did execute and Moncada was entering offsetting orders, he frequently did use the "iceberg" function.

54. The evidence indicates that the large majority of Moncada's large lot orders where canceled without generating any trade, or after only a few contracts were executed. The evidence in Table 8 shows that Moncada typically traded in the opposite direction of his largely

[23] H. Bessembinder, M. Panayides, and K. Venkataraman, 2009, Hidden liquidity: An analysis of order exposure strategies in electronic stock markets, Journal of Financial Economics, 94, 361-383.

unexecuted large lot orders. The data displayed in Figures 1 to 4 shows that, even in those few cases where his large lot orders led to large executions, Moncada took actions to reverse the effects of the large lot executions. On balance, the evidence is strongly consistent with the idea that Moncada did not intend to buy when he posted large buy orders and did not intend to sell when he posted large sell orders, on the eight charge dates or in the broader period studied. In contrast, he consistently traded in the opposite direction as his large lot orders.

V. THE EFFECTS OF MONCADA'S LARGE LOT ORDERS ON THE WHEAT FUTURES MARKETS

V.A. Why Unexecuted Orders Can Affect the Market

55. Moncada quickly canceled most of his large lot orders without any execution, or after the execution of only a few contracts, during the eight days charged, as well as the broader time period. However, the relative paucity of trades resulting from these large lot orders need not imply that the market was unaffected. The orders were fully visible to other market participants, even if for only a short time. Exposed, unexecuted orders can indeed affect the market, for at least two interrelated reasons. First, the presence of a large unexecuted order on one side of the market can give the impression that a well-informed trader intends to execute a large trade to profit from her information. Consider a large buy order that is interpreted to indicate that the trader who submitted the order has positive information about fundamental value. Other traders may elect to also enter buy orders, hoping to profit from the subsequent price rise. They may also post the new buy orders at higher prices than the existing order, to improve the likelihood of order execution. Simultaneously, some traders with standing sell limit orders may elect to cancel their orders or increase the limit price, to avoid selling just before

positive information is revealed to the market. A large visible order can therefore "move the market" even without executing, if it is perceived to convey fundamental information.

56. Second, it is well documented that a high percentage of the order messages in modern markets are generated by computer algorithms. While the specific strategies used by these algorithmic traders are proprietary, the algorithms will typically be programmed to take note of large unexecuted orders. Some algorithms are likely programmed to respond to the posting of a large order by altering their own order submission and cancelation strategies. Trading algorithms can react to the posting of a large order even in situations where a human trader would not have noticed an order that was canceled immediately after it was entered.

57. I provide empirical evidence on the question of whether Moncada's large lot orders affect the wheat futures markets for the eight days charged, as well as the broader time period. In particular, I assess whether his large lot orders are associated with (i) changes in wheat futures price levels, (ii) changes in the volatility of wheat prices, (iii) changes in the liquidity of the wheat futures market as measured by the CBOT bid-ask spread, and (iv) changes in order submissions by other traders.

V.B. Moncada's Large Lot orders, Price Levels, and Price Volatility

58. To assess relations between Moncada's large lot orders and both the level and volatility of wheat prices during the eight days charged, as well as the broader time period, I implement a sophisticated and widely used statistical model known as GARCH.[24] GARCH

[24] GARCH is an acronym for Generalized Autoregressive Conditional Heteroskedasticity. Heteroskedasticity is a statistical term indicating that volatility is not constant, but changes, and reflects that the method is used to study time variation in volatility. Autoregressive refers to statistical series where current outcomes are related to recent outcomes, and in the context of GARCH models refers to the fact that current volatility tends to be positively related to recent volatility. This class of models was introduced by the Nobel-prize winning economist Robert Engle. See Engle, R., 1982, Autoregressive conditional heteroskedasticity with estimates of the variance of United Kingdom Inflation, Econometrica, 50, 987-1007. The "Generalized" portion of the GARCH name refers to the fact that the

models were developed to study variation over time in the volatility of a data series. The GARCH method simultaneously estimates equations for both the level of a series and for the volatility of the series, and was explicitly designed to accommodate the fact that the volatility of financial market data tends to cluster, in the sense that high recent volatility tends to be associated with high current volatility, and vice versa. Though the estimation method is more sophisticated, the interpretation is similar to regression analysis. In the first equation GARCH estimates the effect of one or more explanatory variables on the level of the series. In the second equation GARCH estimates the effect of one or more explanatory variables on the volatility of the series, while accommodating the known clustering in volatility.

59. I use GARCH to study the effect of Moncada's large lot orders on both the level and the volatility of wheat futures prices for the eight days charged, as well as the broader time period. To study CBOT prices, I record the midpoint of the best bid and offer prices from the CBOT BBO datasets, at ten second intervals. I also study the CBOT-KCBT spread price, defined as the most recent CBOT trade price less the most recent KCBT trade price, also recorded at ten second intervals. I study changes in these prices during regular trading hours, 9:30:00 to 13:15:00 on all days when data is available.[25]

60. The explanatory variables I use to study the level of CBOT prices include the first, second, and third ten second lags of the price changes, as well as the contemporaneous, first, second, and third ten second lags of Moncada's net new large lot orders entered. The lagged price changes are included to control for the previously-documented fact that order entry by all market participants trends through time. That is, buy orders tend to follow buy orders,

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method was subsequently expanded to allow past volatility to affect current volatility through a "moving average" term in addition to the "autoregressive" term. See Bollerslev, T., 1986, Generalized autoregressive conditional heteroskedasticity, Journal of Econometrics, 31, 307-327. According to the Google Scholar website the Engle paper has been cited more than14,000 times, and the Bollerslev paper more than 13,000 times.

[25] The spread prices are available only on days when I have audit data for both the CBOT and the KCBT.

and vice versa. Moncada's new orders are included to assess whether they affect the market price level, either contemporaneously or with a lag. The explanatory variable I use to explain market volatility is the absolute value of Moncada's net new order submissions. I use the absolute value because both new buy orders and new sell orders can affect volatility. In addition, the GARCH program also estimates AR (autoregressive) and MA (moving average) parameters to accommodate the known tendency for current market volatility to cluster, i.e. to depend on recent market volatility. Allowing for this clustering is useful in this context, because it allows us to rule out the possibility that a relation between Moncada's order submission and volatility can arise simply because he tends to submit his orders at times when the market is already volatile.

61. Results of estimating the GARCH model are reported on Table 11. Panel A presents results for CBOT midpoints, for the full sample. Panel B reports results for the CBOT-KCBT spread price, for the full sample. Panels C and D present corresponding results for the eight charge dates.

62. Focusing first on the equation for CBOT price changes on the charge dates in Panel C, the estimated coefficient on new Moncada orders is 0.049. Further, the estimated coefficients on the first and second ten second lags of new Moncada orders are 0.036 and 0.011, respectively.[26] The sum of the contemporaneous and lagged coefficients is 0.096. Prices are measured in cents per bushel, while Moncada large lot orders are in thousands of contracts. The interpretation is that for each one thousand net (buy – sell) contracts entered by Moncada in large lot orders, the CBOT midpoint increases by an average of 0.096 cents over the thirty second interval after order entry.

[26] The estimated coefficient for the third lag is not statistically significant; the p-value of .101 indicates a reasonable likelihood that the true coefficient is zero at three lags.

63. Turning next to the equation for the volatility of CBOT price changes, also in Panel C, we observe large and significant AR and MA coefficients. These confirm that the wheat futures market is similar to other financial and commodity markets in that current volatility is strongly related to recent volatility. Most relevant to this matter, the estimated coefficient on the absolute value of Moncada's newly submitted large lot orders is positive and significant (p-value is less than .001). This indicates that Moncada's new large order submissions are reliably associated with increased market volatility on the charge dates.

64. Results for the broader sample mirror those for the charge dates. Focusing on the equation for CBOT price changes in Panel A, the estimated coefficient on new Moncada orders is 0.045, while the estimated coefficients on the first and second ten second lags of new Moncada orders are 0.041 and 0.023, respectively. The interpretation is that in the broader sample, for each one thousand net (buy – sell) contracts entered by Moncada in large lot orders, the CBOT midpoint increases by an average of 0.109 cents over the thirty second interval after order entry.

65. Turning next to the equation for the volatility of CBOT price changes, also in Panel A, we observe that the estimated coefficient on the absolute value of Moncada's newly submitted large lot orders is positive and significant (p-value is less than .001). This indicates that in the broader period as well, Moncada's new large order submissions are reliably associated with increased market volatility, even after controlling for the tendency of market volatility to cluster.

66. The preceding analysis shows that Moncada's large orders affected both the level and the volatility of CBOT prices, for the eight days charged, as well as the broader time period. Moncada traded on both the CBOT and the KCBT, and often entered spread positions. I next

assess if his large orders affected the level and the volatility of the price differential between the CBOT and KCBT prices. Panels B and D of Table 11 present the evidence.

67. The coefficients on new Moncada orders in the equation for changes in the spread price are positive (0.111 on the charge dates and 0.097 in the broader sample) and statistically significant. This result indicates that new large Moncada spread orders (net buy orders on the CBOT minus net buy orders on the KCBT) are reliably associated with a widening of the CBOT-KCBT spread price, and with the notion that Moncada's large lot orders distorted the spread between CBOT and KCBT prices, on the charge dates and in the broader sample. However, in contrast to results for CBOT price changes, coefficients on lagged large Moncada orders are negative, and the sum of contemporaneous, first, and second lag coefficients do not differ significantly from zero. That is, while the evidence indicates that Moncada's orders distort the CBOT-KCBT spread, the estimated effect on spread prices is fleeting.

68. The coefficient estimates on the absolute value of new large CBOT-KCBT spread orders in the volatility equation on Panels B and D are both positive, consistent with the interpretation that Moncada's large lot orders increased the volatility of CBOT-KCBT price spreads as well. However, this estimate is not statistically significant for the charge dates, where the sample size is smaller.[27]

V.C. Moncada's Large Lot orders and CBOT Liquidity

69. I next assess whether Moncada's large lot orders affect CBOT liquidity, as measured by the bid-ask spread and by the net quantity of new orders submitted by traders other than Moncada. The bid-ask spread is the best ask minus the best bid from the CBOT BBO data,

[27] Note that an insignificant coefficient does not imply that the true coefficient is zero. The appropriate interpretation is that the data provides insufficient information to support a definitive assessment. Other things equal, a lack of statistical significance arises more often when sample sizes are smaller.

and is recorded at ten second intervals. I measure net new orders submitted by others as the total size of newly submitted buy orders minus the total size of newly submitted new sell orders for each ten second interval, where the total is computed over all traders except Moncada. Since I have BBO data only for the CBOT this analysis considers only the CBOT bid-ask spread and orders entered on the CBOT.

70. Panel A of Table 12 reports the results of estimating a regression analysis where the dependent variable is the CBOT bid-ask spread. The explanatory variables include three 10-second lags of the bid-ask spread, as well as the absolute value of the net new large lot orders submitted by Moncada during the corresponding ten second interval.[28] The lagged bid-ask spreads control for other market conditions that might affect bid-ask spreads, and also serve to rule out the possibility that the contemporaneous relation between Moncada's large lot orders and spreads arises simply because he tends to submit large lot orders at times when the spread is already wide.

71. The estimated coefficient on the absolute value of Moncada's large new orders is positive and statistically significant in the broader sample period, and is positive but not statistically significant during the charge date sample. This result implies that bid-ask spreads widen, indicating degraded liquidity, at those times when Moncada submits large lot orders. Since Moncada orders are measured in thousands of contracts and the bid-ask spread is measured in cents, the estimated broad sample coefficient of 0.008 indicates that an additional 1000 contracts in large lot orders associated by Moncada is on average associated with an increase in the bid-ask spread of just less .01 cent. While the estimated effect of Moncada's orders on the bid-ask spread is economically small, it should be evaluated in light of the fact that he entered

[28] I use the absolute value of the new orders since there is no particular reason to think that liquidity would depend on the differential between buy and sell orders, while liquidity might be affected by the quantity of orders, independent of whether they are buys or sells.

large lot orders for over 1.5 million contracts in the broad sample and 495,000 contracts on the charge dates.

72. In Panel B of Table 12 I report the results of a regression analysis where the dependent variable is the net (buy minus sell) quantity of new orders submitted by market participants other than Moncada. The explanatory variables include three 10-second lags of the net orders submitted by others, as well as the net (buy minus sell) quantity of new large lot orders submitted by Moncada. The lagged net orders control for market conditions that might affect order submissions strategies, and accommodate the previously documented fact that buy orders tend to follow buy orders and vice versa.[29] In addition, their inclusion rules out the possibility that the contemporaneous coefficient on Moncada's large lot orders arises simply because he tends to submit large net buy orders at times when other market participants are already submitting net buy orders.

73. The estimated coefficient on Moncada's net new large buy orders is 0.017 when estimated from the charge dates, and is 0.015 in the broader sample. Each estimate is statistically significant. I measured Moncada's large lot orders in thousands of contracts, while I measured net orders by other market participants in contracts. The charge date estimate of 0.017 therefore implies that an additional net one thousand contracts in large buy orders posted by Moncada is associated with seventeen contracts in new net buy orders (in excess of new net sell orders) by other market participants.[30]

[29] See, for example, Madhavan, A., Richardson, M., Roomans, M., 1997. Why do securities prices change: a transactions level analysis of NYSE-listed stocks. Review of Financial Studies 10, 1035–1064.

[30] I also examine the extent to which this finding results from increased order submission on the same side as Moncada's large orders versus decreased order submission on the opposite side. The results indicate the effect is concentrated on the same side – i.e. other traders increase their rate of buy order submissions when Moncada posts large lot buys, other traders increase their rate of sell order submissions when Moncada posts large lot sells.

74. This finding is important from two perspectives. First, it supports the interpretation that one channel by which Moncada's large lot orders affect the wheat futures market is that they alter the order submissions of other traders. Second, it provides additional evidence to distinguish between the sunshine trading and spoofing hypotheses. Under the sunshine trading theory large buy orders would be used to signal the intention to buy, in hopes of attracting additional sell orders from potential counterparties, and vice versa. If the sunshine trading theory is correct, the estimated coefficient on Moncada's net large lot order entry in Panel B of Table 12 should be negative, as large lot buy orders by Moncada would attract net sell orders by others.

75. Under the spoofing theory large buy orders are used to falsely signal buying pressure, so as to induce other participants to submit additional buy orders. These additional buy orders are useful to the party that posted the large buy orders if he actually intends to sell. The positive coefficients reported in Panel B of Table 12 are therefore inconsistent with the sunshine trading theory, but are consistent with the notion that Moncada's large lot orders were part of a successful spoofing strategy during the eight charge dates as well as during the broader time period studied.

76. To summarize, the evidence indicates that Moncada's large lot orders affected the market for wheat futures. His large lot orders affected price levels (increasing prices with net large lot buy orders and decreasing prices with net large lot sell orders), affected the volatility of prices, and affected order submissions by other traders. These effects are statistically significant, implying that they cannot be attributed to random outcomes, for the charge dates and for the broader period studied, and are consistent with the theory of spoofing.

VI. SUMMARY OF FINDINGS

77. I study audit data provided by the CBOT and the KCBT, best bid and offer data from the CBOT, and log file data provided by Moncada's Futures Commission Merchant, to assess large lot orders for December 2009 wheat futures entered by Moncada. I find that:

(i) On the eight charge dates, over 470,000 orders were entered for the December 2009 CBOT wheat futures contract, but only 853 (0.18% of total) were large lots. Further, 710 of these large lot orders were entered by Moncada, while all other market participants combined entered only 143 large lot orders. The broader period that I studied included 3,259 large lot orders, 2,351 of which were submitted Moncada.

(ii) Moncada cancelled most of his large lot orders, and did so very quickly, as compared either to other market participants who submitted large lot orders or to Moncada's own small lot orders. On the eight charge dates Moncada canceled 99.6% of the large lot orders he entered on the CBOT. By comparison, other market participants canceled only 28.7% of their large lot orders, and Moncada canceled 51.5% of his small lot orders. Moncada canceled his large lot orders an average of only 2.1 seconds after he entered them, and 92.5% of his large lot order cancelations occurred within five seconds of entry. By comparison, other participants who entered and canceled large lot orders on the charge dates did so after an average of 127 minutes, and only 4% were canceled within five seconds. The broader time period is similar to the eight charge dates, in that Moncada canceled a large percentage of his orders 99.6%, and did so quickly (within 4.6 seconds, on average).

(iii) Moncada selected limit prices to match the best bid or offer ("BBO") for more than three quarters of his large CBOT orders on the charge dates and also in the broader time period, and he selected a limit price within 10 ticks of the BBO for all of his large lot orders on the charge dates and 99.9% of his large lot orders in the

broader sample. Related, while Moncada had the option to hide some of his order size by use of "Iceberg" orders, he used this option for less than 1% of his large lot orders. These choices ensured that Moncada's large lot orders were (briefly, before they were canceled) fully visible to other CBOT market participants, including computerized trading algorithms.

(iv) Moncada's large lot orders generated very few actual trades. On the eight charge dates only 14.4% of Moncada's large lot CBOT orders generated any trades at all, and among those that generated some trade, an average of only 1.1% of the order size was executed. By comparison, large lot orders submitted by other CBOT participants on the charge dates led to trades 92.3% of the time, and among those that generated some trade, an average of 45.2% of the order size was executed. Results for the broader time period are similar, in that only 12.1% of Moncada's large lot CBOT orders generated any trades at all, and among those that generated some trade, an average of only 0.9% of the order size was executed.

(v) Moncada's actual trades were systematically in the *opposite* direction of his large lot orders. That is, he on balance purchased wheat futures contracts after submitting large sell orders and he sold wheat futures contracts after submitting large buy orders. Focusing on the eight charge dates, for each 1000 contracts in large lot orders entered, Moncada subsequently traded in the opposite direction an average of 7 contracts within two minutes, 38 contracts within ten minutes, 78 contracts within thirty minutes, and 107 contracts within sixty minutes. The same general pattern appears in the broader data sample, where for each 1000 contracts in large lot orders entered, Moncada subsequently traded in the opposite direction an average of 8 contracts within two minutes, 25 contracts within ten minutes, 48 contracts within thirty minutes, and 67 contracts within sixty minutes.

(vi) Moncada's large lot orders affected the wheat futures markets on the eight charge dates as well as in the broader period studied. On average wheat prices moved (increasing with buy orders and decreasing with sell orders), bid-ask spreads

widened, market volatility increased, and the rate of order entry by other traders was altered when he entered his large lot orders.

78. In light of these findings, I conclude for the eight charge dates in particular as well as for the broader period studied, that Moncada entered numerous large lot orders for December 2009 wheat futures without intending that the large lot orders would lead to transactions. The evidence instead strongly supports the conclusion that he entered the large lot orders with the intent to alter market conditions in advance of actual trades in the opposite direction. That is, he intended to (and did) sell wheat contracts after he entered large buy orders, and he intended to (and did) purchase wheat contracts after he entered large sell orders. Further, the evidence indicates that his large lot orders adversely affected the wheat futures market by altering price levels, increasing price volatility, decreasing market liquidity, and by altering the order submissions of other traders.

Hendrik Bessembinder

4/25/13

Date

Table 1:Large Lot orders Entered by EM4, and Executions on Those Orders

	CBOT			KCBT		
Calendar Date	# Orders Entered	Total Order Size (Contracts)	Total Contracts Traded from Large Orders	# Orders Entered	Total Order Size (Contracts)	Total Contracts Traded from Large Orders
13-Aug-09	2	400	0	NA	NA	NA
25-Aug-09	6	2,700	0	NA	NA	NA
26-Aug-09	13	6,200	0	NA	NA	NA
27-Aug-09	56	27,502	4	NA	NA	NA
31-Aug-09	37	17,614	2	11	4,902	0
1-Sep-09	48	22,620	6	48	23,204	15
2-Sep-09	1	500	0	0	0	0
3-Sep-09	20	9,804	31	11	5,400	0
8-Sep-09	1	500	0	0	0	0
9-Sep-09	2	1,000	0	0	0	0
10-Sep-09	17	7,908	0	3	1,100	0
11-Sep-09	2	1,000	0	12	6,000	3
14-Sep-09	81	38,144	24	23	10,714	3
15-Sep-09	90	39,272	72	35	14,924	0
16-Sep-09	0	0	0	38	18,118	0
17-Sep-09	5	2,500	15	5	2,500	0
18-Sep-09	58	27,920	11	33	16,010	0
20-Sep-09	1	202	0	0	0	0
21-Sep-09	42	20,706	5	25	12,108	6
22-Sep-09	45	17,210	564	24	11,212	0
23-Sep-09	34	16,312	48	37	18,010	8
24-Sep-09	46	22,312	6	25	11,170	46
25-Sep-09	47	22,512	47	11	5,500	2
28-Sep-09	4	1,902	0	0	0	0
29-Sep-09	36	16,618	7	28	12,524	30
30-Sep-09	39	14,056	114	33	13,630	5
1-Oct-09	2	1,000	0	0	0	0
2-Oct-09	23	7,444	360	6	2,110	0
5-Oct-09	3	1,302	0	2	902	0
6-Oct-09	46	17,924	213	20	8,620	12
7-Oct-09	21	9,616	0	20	8,322	16
8-Oct-09	41	11,224	578	7	2,910	1
9-Oct-09	3	1,204	0	0	0	0
12-Oct-09	71	29,266	220	71	32,358	66
13-Oct-09	77	31,612	56	53	22,854	11
14-Oct-09	115	49,726	260	123	53,460	69
15-Oct-09	27	9,541	561	31	14,220	53
16-Oct-09	23	10,416	4	17	7,518	7
18-Oct-09	1	202	0	0	0	0
19-Oct-09	116	35,349	282	46	19,256	61
20-Oct-09	0	0	0	1	402	0
25-Oct-09	2	404	3	1	202	1
26-Oct-09	107	42,474	489	19	8,712	4
27-Oct-09	98	34,361	502	42	17,250	28
28-Oct-09	14	5,618	50	25	11,322	12
29-Oct-09	118	49,088	165	122	50,668	23
30-Oct-09	37	16,438	5	69	30,076	17
3-Nov-09	1	500	0	9	4,304	0
4-Nov-09	19	9,206	6	35	16,414	14
5-Nov-09	63	28,944	22	38	17,918	40
6-Nov-09	99	41,944	517	14	6,314	0
9-Nov-09	28	12,324	22	8	3,212	1
10-Nov-09	75	29,012	270	15	6,812	5
11-Nov-09	91	38,406	47	34	15,940	18
12-Nov-09	48	19,038	19	34	15,330	2
13-Nov-09	42	18,264	45	22	10,410	1
16-Nov-09	43	17,758	8	12	4,918	3
17-Nov-09	22	10,606	9	7	3,402	0
18-Nov-09	7	3,206	6	0	0	0
19-Nov-09	31	13,886	197	6	2,902	5
20-Nov-09	79	32,882	50	33	15,316	35
23-Nov-09	25	11,606	131	0	0	0
Total	**2,351**	**989,205**	**6,053**	**1,344**	**601,380**	**623**
Aug Total	114	54,416	6	11	4,902	0
Sep Total	619	282,998	950	391	182,124	118
Oct Total	945	364,209	3,748	675	291,162	381
Charge Dates	710	274,626	2,136	512	220,400	280
Nov Total	673	287,582	1,349	267	123,192	124

Notes

Based on data in available CBOT and KCBT Audit Files for December 2009 Wheat Futures Contract
For records with Tag50 variable equal to "EM4"
NA indicates data is not available for the date. Dates with no large EM4 order entries are excluded.
Charge dates are October 6, 12, 14, 19, 26, 27, 29, and 30, 2009

Table 2: EM4 Market Shares in CBOT Orders Entered and Resulting Trades

	Total Order Entry (Contracts)	Total Trades (Contracts)
Small Lot Orders, Not EM4	8,885,188	2,867,056
Large Lot Orders, Not EM4	337,941	92,797
Small Lot Orders by EM4	167,721	50,398
Large Lot Orders by EM4	989,205	6,053
CBOT Total	10,380,055	3,016,304
CBOT Large Lot Order Total	1,327,146	98,850
EM4 Large Order Share of EM4 Total	85.5%	10.7%
EM4 Large Order Share of Large CBOT Orders	74.5%	6.1%
EM4 Total Share of CBOT Total	11.1%	1.9%

Notes

Includes day limit orders for the December 2009 CBOT Wheat futures contract.
Based on all available CBOT Audit data from August 13 to November 30, 2009
For records with Tag50 variable equal to "EM4"
Large Lot Orders are for 200 or more contracts, and trades are those resulting from the Large Lot Orders

Table 3: Order Entry and Cancelation on the CBOT

				CBOT Orders that Were Cancelled		
	Number of Orders Entered	Number of Orders Cancelled	Percent Cancelled	Mean Time to Cancel	Percent cancelled within 1 second	Percent cancelled within 5 seconds
Panel A: All Days						
Small Lot Orders, Not EM4	3,282,620	2,291,162	69.8%	234.9	28.6%	40.0%
Large Lot Orders, Not EM4	908	327	36.0%	4,378.5	2.5%	8.1%
Small Lot Orders by EM4	25,010	12,161	48.6%	664.2	6.2%	17.8%
Large Lot Orders by EM4	2,351	2,342	99.6%	4.6	76.9%	94.9%
Hypothesis Tests (p-values)						
Large Lot Orders Equal, EM4 vs. other				(<.001)	(<.001)	(<.001)
EM4 Equal, Large vs. Regular				(<.001)	(<.001)	(<.001)
Panel B: Charge Dates						
Small Lot Orders, Not EM4	466,201	330,401	70.9%	244.9	35.2%	45.3%
Large Lot Orders, Not EM4	143	41	28.7%	7,623.3	0.0%	3.6%
Small Lot Orders by EM4	5,498	2,830	51.5%	605.4	6.5%	21.3%
Large Lot Orders by EM4	710	707	99.6%	2.1	72.1%	92.5%
Hypothesis Tests (p-values)						
Large Lot Orders Equal, EM4 vs. other				(<.001)	(<.001)	(<.001)
EM4 Equal, Large vs. Regular				(<.001)	(<.001)	(<.001)

Notes

Includes day limit orders for the December 2009 CBOT Wheat futures contract.
Elapsed time is measured from entry or most recent modification, in seconds
Based on all available CBOT Audit data from August 13 to November 30, 2009
For records with Tag50 variable equal to "EM4"
Large lot orders are for 200 or more contracts
Charge dates are October 6, 12, 14, 19, 26, 27, 29, and 30, 2009

Table 4: KCBT Orders that were Subsequently Canceled

	Number	Mean Time to Cancel	Proportion within 1 second	Proportion within 5 seconds
Panel A: All Days				
Small Lot Orders, Not EM4	5,958,531	8.1	83.0%	92.4%
Large Lot Orders, Not EM4	2	316.8	0.0%	50.0%
Small Lot Orders by EM4	8,646	125.7	27.2%	57.1%
Large Lot Orders by EM4	1,344	1.0	84.4%	98.3%
Hypothesis Tests (p-values)				
Large Lot Orders Equal, EM4 vs other		(0.052)	(0.002)	(0.010)
EM4 Equal, Large vs. other		(<.001)	(<.001)	(<.001)
Panel B: Charge Dates				
Small Lot Orders, Not EM4	954,100	6.0	86.7%	94.1%
Large Lot Orders, Not EM4	0	NA	NA	NA
Small Lot Orders by EM4	1,661	75.9	24.0%	56.2%
Large Lot Orders by EM4	512	1.0	87.3%	98.6%
Hypothesis Tests (p-values)				
EM4 Equal, Large vs. Regular		(<.001)	(<.001)	(<.001)

Notes

Includes day limit orders that were subsequently canceled, for the December 2009 KCBT Wheat futures contract.
Elapsed time is measured from entry or most recent modification, in seconds
Based on all available KBT Audit data from September 1 to November 30, 2009
For records with Tag50 variable equal to "EM4"
Large Lot orders are for 200 or more contracts
Charge dates are October 6, 12, 14, 19, 26, 27, 29, and 30, 2009

Table 5: CBOT Order Entry and Orders that Gave Rise to Trades

				CBOT Orders that led to Trades				
	Number of Orders Entered	Number of Orders with Trades	Trades/ Entries	Mean Time to First Trade	Mean Time to Last Trade	Percent of Order Size Executed	Percent of orders with immediate execution	Percent of orders with immediate full execution
Panel A: All Days								
Small Lot Orders, Not EM4	3,282,620	984,096	30.0%	234.80	243.23	29.2%	11.8%	10.6%
Large Lot Orders, Not EM4	908	711	78.3%	1071.27	1392.98	40.2%	36.0%	2.6%
Small Lot Orders by EM4	25,010	13,123	52.5%	178.88	187.73	47.3%	17.6%	15.0%
Large Lot Orders by EM4	2,351	285	12.1%	16.54	17.71	0.9%	6.2%	0.2%
Hypothesis Tests (p-values)								
Large Lot Orders Equal, EM4 vs other				(<.001)	(<.001)	(<.001)	(.011)	(.448)
EM4 Equal, Large vs. other				(<.001)	(<.001)	(<.001)	(.054)	(<.001)
Panel B: Charge Dates								
Small Lot Orders, Not EM4	466,201	135,264	29.0%	242.97	249.24	28.2%	11.5%	10.3%
Large Lot Orders, Not EM4	143	132	92.3%	1608.99	1865.83	45.2%	36.2%	3.6%
Small Lot Orders by EM4	5,498	2,837	51.6%	251.72	264.7	45.5%	17.2%	14.2%
Large Lot Orders by EM4	710	102	14.4%	0.45	0.75	1.1%	7.6%	0.3%
Hypothesis Tests (p-values)								
Large Lot Orders Equal, EM4 vs. other				(<.001)	(<.001)	(<.001)	(.971)	(.923)
EM4 Equal, Large vs. Regular				(.304)	(<.325)	(<.001)	(.038)	(<.001)

Notes

Includes day limit orders for the December 2009 CBOT Wheat futures contract.
Elapsed time is measured from entry or most recent modification, in seconds
Based on all available CBOT Audit data from August 13 to November 30, 2009
For records with Tag50 variable equal to "EM4"
Large Lot Orders are for 200 or more contracts
Charge dates are October 6, 12, 14, 19, 26, 27, 29, and 30, 2009
Immediate executions are those with trade time less than 0.1 second of order entry time

Table 6: Limit Order Prices Relative to Best Bid or Offer (BBO)

	CBOT Orders Entered or Modified			
	Number	Mean Ticks to BBO	Percentge Matching BBO	Percentage within 10 ticks of BBO
Panel A: All Days				
Small Lot Orders, Not EM4	41,693,902	6.0	3.2%	83.6%
Large Lot Orders, Not EM4	1,260	13.9	24.6%	74.9%
Small Lot Orders by EM4	2,945,070	6.7	0.6%	82.8%
Large Lot Orders by EM4	2,347	0.1	77.3%	99.9%
Hypothesis Tests (p-values)				
Large Lot Orders Equal, EM4 vs other		(<.001)	(<.001)	(<.001)
EM4 Equal, Large vs. other		(<.001)	(<.001)	(<.001)
Panel B: Charge Dates				
Small Lot Orders, Not EM4	6,867,407	5.4	3.6%	86.2%
Large Lot Orders, Not EM4	200	18.0	31.0%	76.5%
Small Lot Orders by EM4	584,286	6.6	0.6%	85.0%
Large Lot Orders by EM4	710	0.2	77.1%	100.0%
Hypothesis Tests (p-values)				
Large Lot Orders Equal, EM4 vs. other		(<.001)	(<.001)	(<.001)
EM4 Equal, Large vs. Regular		(<.001)	(<.001)	(<.001)

Notes

Includes all available day limit orders entered or modified for the
December 2009 CBOT Wheat futures contract, from August 13 to November 30, 2009
Ticks to BBO are measured as limit price - best ask for sell orders,
and as best bid - limit price for buy orders, and can be negative
For records with Tag50 variable equal to "EM4"
Large lot orders are for 200 or more contracts
Charge dates are October 6, 12, 14, 19, 26, 27, 29, and 30, 2009

Table 7: Percent of EM4 CBOT Orders Using "Iceberg" function

			Percent of Orders		
	Size	**Action**	**Iceberg**	**Manual**	**# Orders**
All Orders					
	Small Lot	Add	1.66%	31.80%	13,281
	Small Lot	Change	0.00%	0.00%	1,114,301
	Large Lot	Add	0.60%	100.00%	998
Orders Entered Manually					
	Small Lot	Add	5.21%	100.00%	4,224
	Large Lot	Add	0.60%	100.00%	998

Notes

Based on Data in BES and Serdika Log Files, for Trader EM4
Records with source = "ToClnt", and Action equal to "Add" or "Change"
Large Lot Orders are those with ordqty variable of 200 or greater
Iceberg orders are those where the OrdRes field contains "Iceberg"
Manual orders are those where field47 contains "OrderSRC=Normal OS"
Includes only orders for "DEC09" expiry

Table 8: EM4 Large Lot Order Entry and Subsequent Changes in Actual Positions

Panel A: All Days, Outright Positions and Orders Aggregated Across KCBT and CBOT

Position Changes Measured	Coefficient	(P-value)
Over Same 10 Seconds	-0.59	(.063)
10 seconds later	-1.16	(.031)
1 minute later	-4.83	(<.001)
2 minutes later	-8.07	(<.001)
5 minutes later	-15.15	(<.001)
10 minutes later	-24.69	(<.001)
20 minutes later	-36.37	(<.001)
30 minutes later	-48.43	(<.001)
60 minutes later	-67.48	(<.001)

Panel B: All Days, Spread Positions and Orders Computed as CBOT less KCBT

Position Changes Measured	Coefficient	(P-value)
Over Same 10 Seconds	-1.30	(.001)
10 seconds later	-2.11	(<.001)
1 minute later	-7.39	(<.001)
2 minutes later	-12.03	(<.001)
5 minutes later	-19.64	(<.001)
10 minutes later	-31.90	(<.001)
20 minutes later	-37.34	(<.001)
30 minutes later	-46.68	(<.001)
60 minutes later	-63.27	(<.001)

Panel C: Charge Dates, Outright Positions and Orders Aggregated Across KCBT and CBOT

Position Changes Measured	Coefficient	(P-value)
Over Same 10 Seconds	0.22	(.770)
10 seconds later	-0.65	(.602)
1 minute later	-3.39	(.221)
2 minutes later	-6.89	(.065)
5 minutes later	-19.34	(.012)
10 minutes later	-38.01	(.002)
20 minutes later	-56.07	(<.001)
30 minutes later	-78.02	(<.001)
60 minutes later	-107.47	(<.001)

Panel D: Charge Dates, Spread Positions and Orders Computed as CBOT less KCBT

Position Changes Measured	Coefficient	(P-value)
Over Same 10 Seconds	-0.39	(.740)
10 seconds later	-0.76	(.606)
1 minute later	-5.53	(.086)
2 minutes later	-12.40	(.003)
5 minutes later	-22.47	(.002)
10 minutes later	-37.23	(<.001)
20 minutes later	-36.58	(<.001)
30 minutes later	-44.46	(<.001)
60 minutes later	-54.72	(<.001)

Notes

Reported are slope coefficients estimated by OLS regression of EM4 actual position changes on net new EM4 large orders.
Based on data from 9:30 to 13:15,on all available days
Positions are based on executed EM4 trades since midnight,
measured as accumulated buys minus accumulated sells, in contracts
EM4 large orders are those with size of 200 or more, and net order size is buy size - sell size, in 1000s of contracts
Outright Positions and Orders are based on sum across CBOT and KCBT,
while Spread Positions and Orders are CBOT Positions and Orders Less KCBT Positions and Orders

Table 9: EM4 Wash Trading on the CBOT

Date	Purchased By Serdika, Sold by BES	Sold by Serdika, purchased by BES
6-Oct-09	88	7
7-Oct-09	8	0
12-Oct-09	133	0
15-Oct-09	249	0
29-Oct-09	0	153
3-Nov-09	32	0
4-Nov-09	6	0
6-Nov-09	0	229
Total	516	389

Notes

The table reports on the number of contracts where EM4 was on both sides of a CBOT transaction

Wash trades are identified by a common CBOT-assigned MatchNum

Based on all available CBOT Audit data from August 13 to November 30, 2009

Table 10: Examples of EM4's Use of Large Iceberg Orders After Execution of Exposed Large Lot Orders

Date	Time	Order Size	Buy/Sell	Iceberg
2-Oct-09	10:35:26.162	202	Sell	No
2-Oct-09	10:35:32.895	100	Buy	Yes
2-Oct-09	10:36:30.365	100	Buy	Yes
2-Oct-09	10:37:27.256	100	Buy	Yes
2-Oct-09	11:22:43.489	102	Buy	Yes
27-Oct-09	10:10:22.124	202	Buy	No
27-Oct-09	10:10:25.608	100	Sell	Yes
27-Oct-09	10:10:36.124	100	Sell	Yes
27-Oct-09	10:12:43.252	100	Sell	Yes
27-Oct-09	10:14:39.739	100	Sell	Yes

Notes:

The Non-Iceberg order on Oct. 2 executed 200 contracts immediately upon entry

The Non-Iceberg order on Oct. 27 executed 202 contracts immediately upon entry

Table 11: GARCH Estimation of the Effects of Large EM4 Orders on Price and Volatility

Panel A: CBOT Price Changes and Volatility, Explaned by Large Outright EM4 Orders, Full Sample

CBOT Price Changes	Coefficient	P-Value
Intercept	0.000	(0.640)
Lag 1 Price Change	0.271	(<.001)
Lag 2 Price Change	0.321	(<.001)
Lag 3 Price Change	0.266	(<.001)
New EM4 Orders	0.045	(<.001)
Lag 1 New EM4 Orders	0.041	(<.001)
Lag 2 New EM4 Orders	0.023	(<.001)
Lag 3 New EM4 Orders	0.000	(0.821)

Volatility of CBOT Price Changes	Coefficient	P-Value
Intercept	0.000	(<.001)
AR term	0.613	(<.001)
MA term	0.588	(<.001)
Abs (New EM4 Orders)	0.003	(<.001)

Panel B: CBOT-KCBT Spread Changes and Volatility, Explaned by Large Spread EM4 Orders, Full Sample

CBOT-KCBT Spread Changes	Coefficient	P-Value
Intercept	-0.003	(<.001)
Lag 1 Spread Change	-0.026	(<.001)
Lag 2 Spread Change	-0.015	(<.001)
Lag 3 Spread Change	-0.008	(<.001)
New EM4 Orders	0.097	(<.001)
Lag 1 New EM4 Orders	-0.085	(<.001)
Lag 2 New EM4 Orders	-0.024	(.049)
Lag 3 New EM4 Orders	-0.018	(.029)

Volatility of CBOT-KCBT Spread Changes	Coefficient	P-Value
Intercept	0.012	(<.001)
AR term	0.182	(<.001)
MA term	0.730	(<.001)
Abs (New EM4 Orders)	0.011	(<.001)

Panel C: CBOT Price Changes and Volatility, Explaned by LargeOutright EM4 Orders, Charge Days

CBOT Price Changes	Coefficient	P-Value
Intercept	-0.003	(<.001)
Lag 1 Price Change	0.285	(<.001)
Lag 2 Price Change	0.305	(<.001)
Lag 3 Price Change	0.221	(<.001)
New EM4 Orders	0.049	(<.001)
Lag 1 New EM4 Orders	0.036	(<.001)
Lag 2 New EM4 Orders	0.011	(0.028)
Lag 3 New EM4 Orders	-0.006	(0.101)

Volatility of CBOT Price Changes	Coefficient	P-Value
Intercept	0.002	(<.001)
AR term	0.823	(<.001)
MA term	0.250	(<.001)
Abs (New EM Orders)	0.003	(<.001)

Panel D: CBOT-KCBT Spread Changes and Volatility, Explaned by Large Spread EM4 Orders, Charge Days

CBOT-KCBT Spread Changes	Coefficient	P-Value
Intercept	-0.003	(0.131)
Lag 1 Spread Change	-0.018	(<.001)
Lag 2 Spread Change	-0.011	(<.001)
Lag 3 Spread Change	-0.006	(0.004)
New EM4 Orders	0.111	(<.001)
Lag 1 New EM4 Orders	-0.114	(<.001)
Lag 2 New EM4 Orders	-0.041	(0.066)
Lag 3 New EM4 Orders	0.030	(0.138)

Volatility of CBOT-KCBT Spread Changes	Coefficient	P-Value
Intercept	0.013	(<.001)
AR term	0.214	(<.001)
MA term	0.686	(<.001)
Abs (New EM Orders)	0.005	(0.186)

Notes

Based on data at 10 second intervals from 9:30 to 13:15,on all available days

EM4 large orders are those with size greater than 200 contracts, and new orders are measured as buy size - sell size, in 1000s of contracts

Outright Orders are based on sum across CBOT and KCBT, while Spread Orders are CBOT Orders Less KCBT Orders

Observations with a change in the KCBT-CBOT spread of more than four cents in a ten second interval are deleted to ensure convergence.

Reported are coefficients estimated by a GARCH (Generalized Autoregressive Conditional Heteroskedasticity) Model, with 1 AR and 1 MA term.

Table 12: EM4 Large Lot Order Entry and CBOT Market Liquidity

Panel A: Dependent Variable is CBOT Bid-Ask Spread

	Full Sample		Charge Dates Only	
Variable	Coefficient	(p-value)	Coefficient	(p-value)
Intercept	0.000	(<.001)	0.045	(<.001)
Lag 1 Spread	0.603	(<.001)	0.141	(<.001)
Lag 2 Spread	0.233	(<.001)	0.061	(<.001)
Lag 3 Spread	0.163	(<.001)	0.053	(<.001)
Abs (Large Moncada Orders)	0.008	(<.001)	0.003	(.156)

Panel B: Dependent Variable is CBOT Net New Order Entry By Others

	Full Sample		Charge Dates Only	
Variable	Coefficient	(p-value)	Coefficient	(p-value)
Intercept	0.001	(<.001)	0.000	(.730)
Lag 1 Orders by Others	0.221	(<.001)	0.102	(<.001)
Lag 2 Orders by Others	0.048	(<.001)	0.028	(<.001)
Lag 3 Orders by Others	0.048	(<.001)	0.049	(.004)
Large Moncada Orders	0.015	(<.001)	0.017	(.009)

Notes:

Based on all available CBOT Audit data

EM4 Large Lot Orders are those with size of 200 or more, and are measured in 1000's

Others' orders are of all sizes, and are measured in contracts.

Analysis is based on net new order entry, measured as new buy orders minus new sell orders

Reported are coefficients estimated by least squares regression

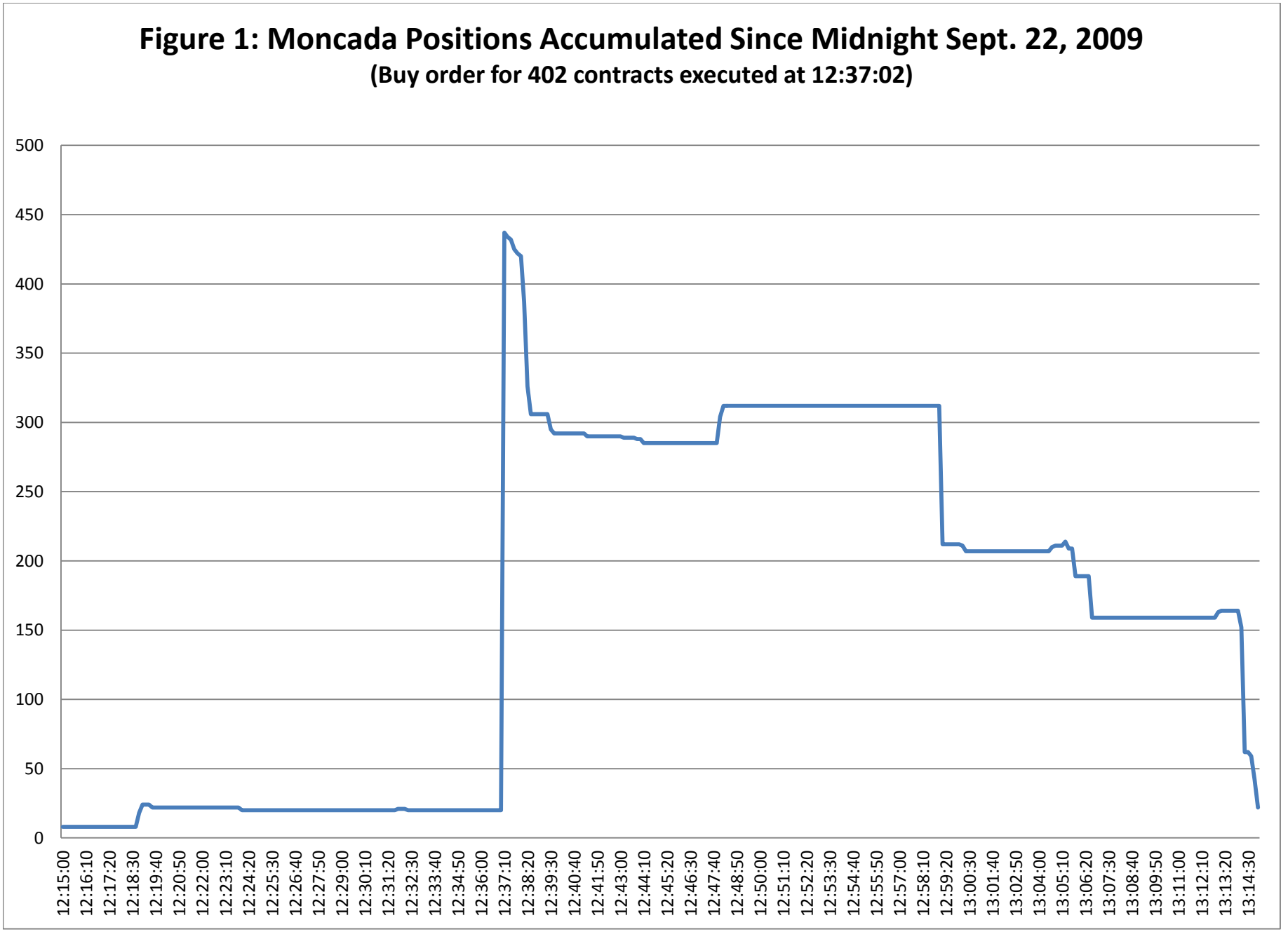


Figure 1: Moncada Positions Accumulated Since Midnight Sept. 22, 2009
(Buy order for 402 contracts executed at 12:37:02)
500
450
400
350
300
250
200
150
100
50
0
12:15:00
12:16:10
12:17:20
12:18:30
12:19:40
12:20:50
12:22:00
12:23:10
12:24:20
12:25:30
12:26:40
12:27:50
12:29:00
12:30:10
12:31:20
12:32:30
12:33:40
12:34:50
12:36:00
12:37:10
12:38:20
12:39:30
12:40:40
12:41:50
12:43:00
12:44:10
12:45:20
12:46:30
12:47:40
12:48:50
12:50:00
12:51:10
12:52:20
12:53:30
12:54:40
12:55:50
12:57:00
12:58:10
12:59:20
13:00:30
13:01:40
13:02:50
13:04:00
13:05:10
13:06:20
13:07:30
13:08:40
13:09:50
13:11:00
13:12:10
13:13:20
13:14:30

Figure 2: Moncada Position Accumlated Since Midnight, Oct. 2, 2009
(200 contract sell executed at 10:35:26)

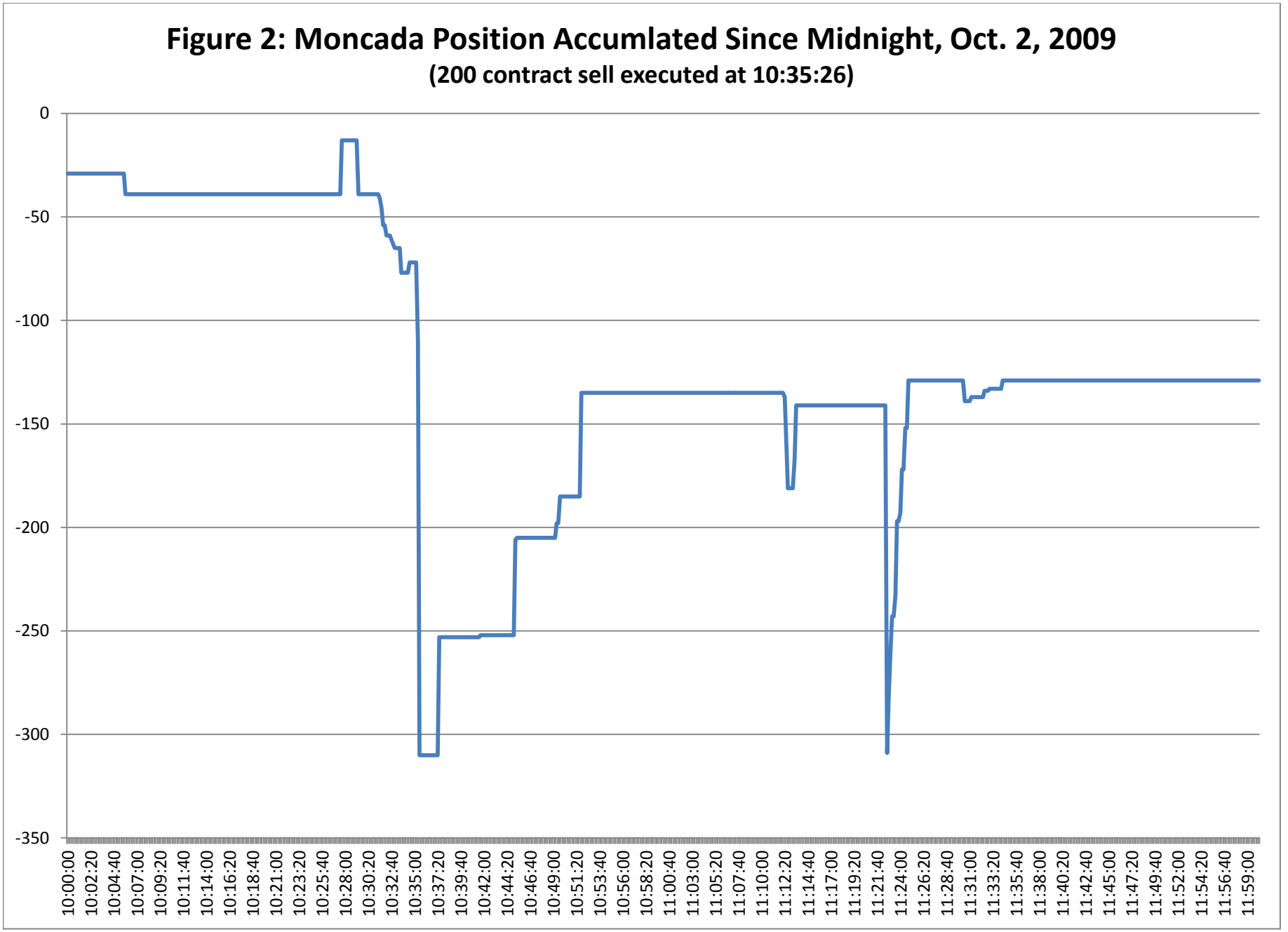


Figure 3: Moncada Positions Accumulated Since Midnight, Oct. 12, 2009
(Buy order for 202 contracts executed at 12:16:35)

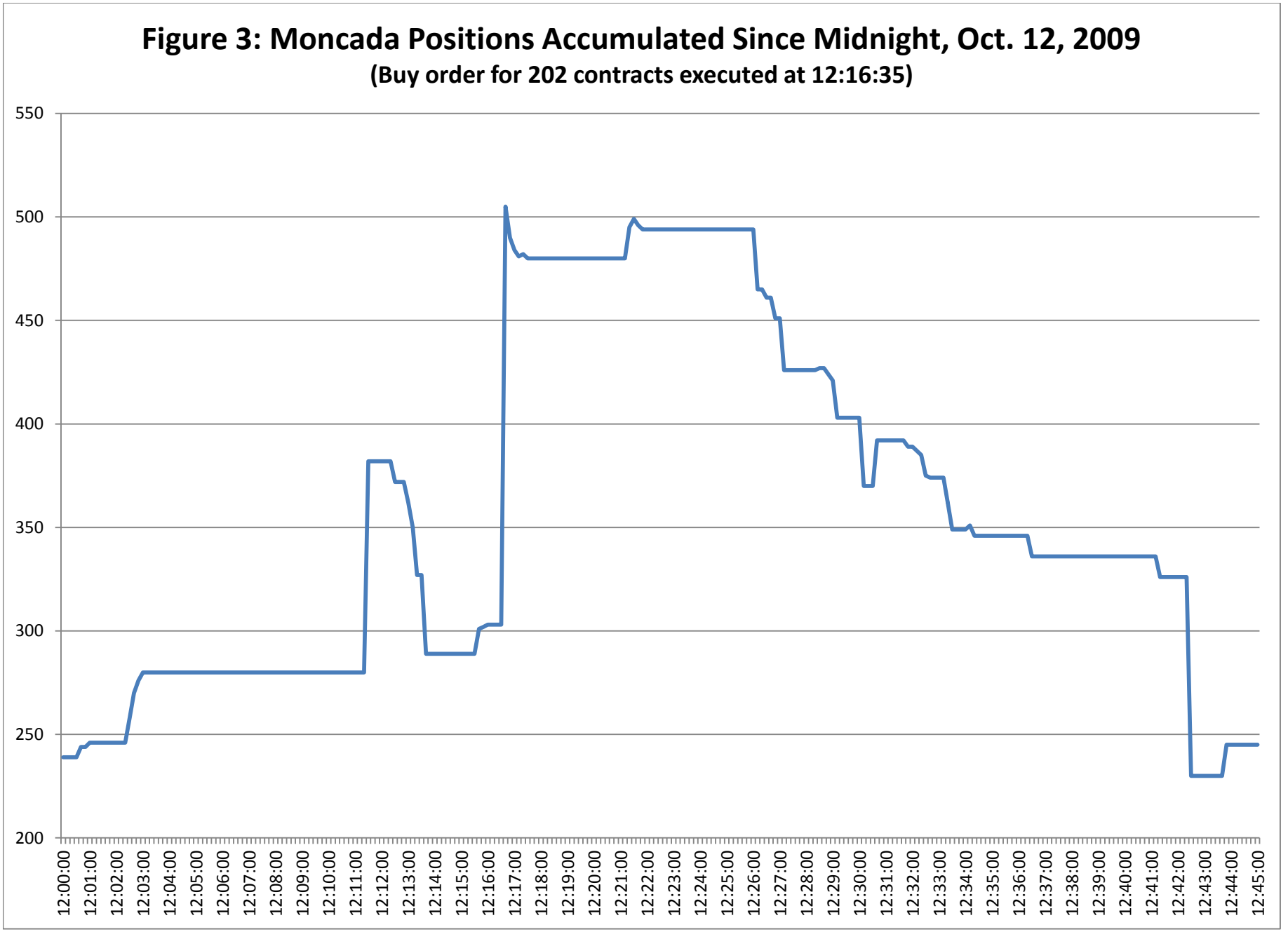
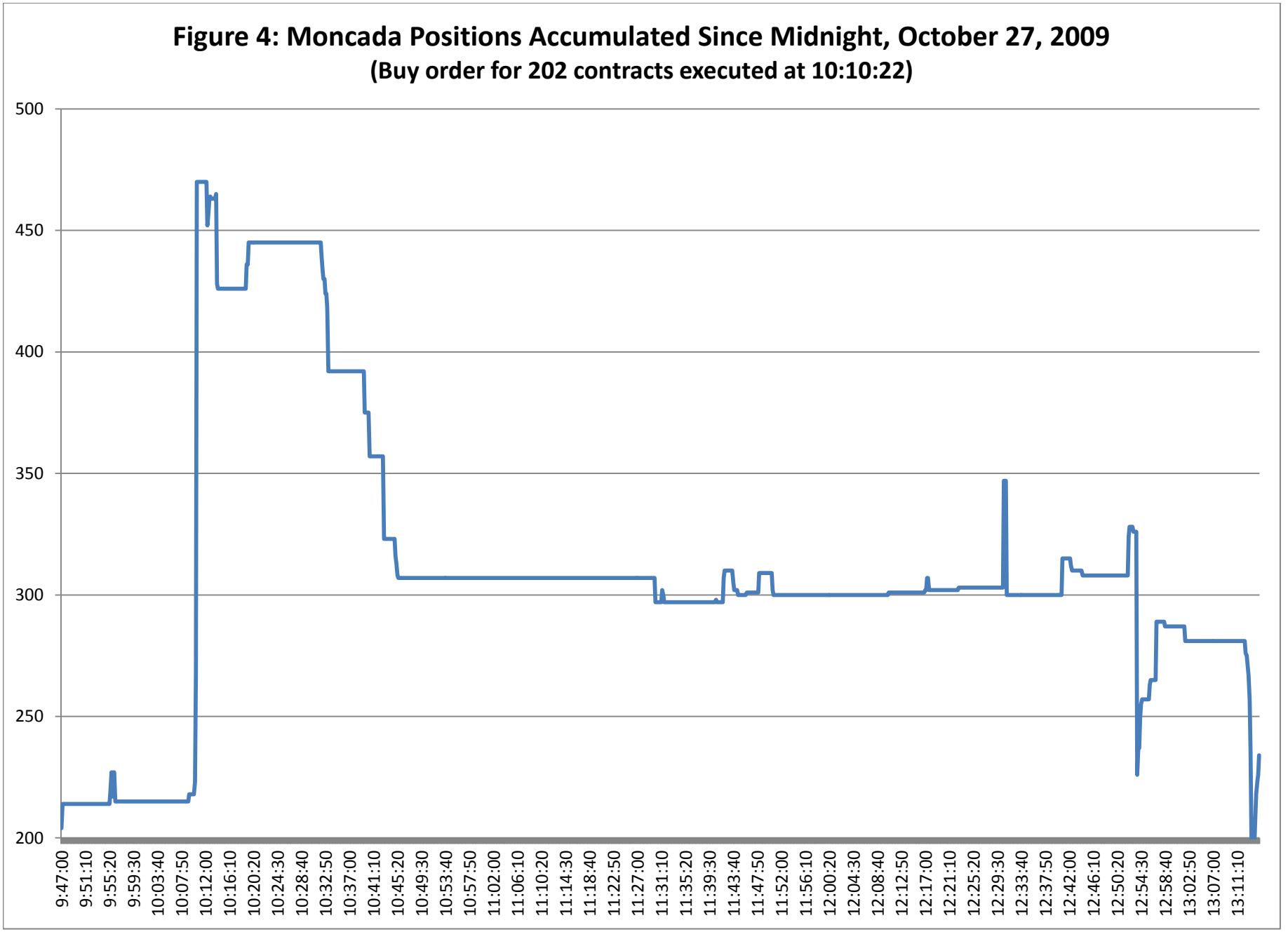


Figure 4: Moncada Positions Accumulated Since Midnight, October 27, 2009
(Buy order for 202 contracts executed at 10:10:22)



Appendix A: Resume of Hendrik Bessembinder

APPOINTMENT:

A. Blaine Huntsman Chaired Presidential Professor of Finance, David Eccles School of Business, University of Utah, 2001-present.

PREVIOUS APPOINTMENTS:

Professor of Finance, Goizueta Business School, Emory University, 1999-2001.

Professor, Associate Professor, Assistant Professor of Finance, College of Business, Arizona State University, 1989-1999.

Visiting Assistant Professor of Finance, Simon Graduate School of Business, University of Rochester, 1986-1989.

Instructor, School of Business, University of Washington, 1982-85.

Financial Analyst, Pacific Northwest Bell Telephone Company, 1979-82.

Lecturer, College of Business, Washington State University, 1978-79.

EDUCATION

Ph.D.	The University of Washington, 1986, Major in Finance, minors in Mathematics, Business Economics, and Research Methods.
M.B.A.	Washington State University, 1978, Finance concentration.
B.S.	Utah State University, 1977, cum laude, Business major with Economics minor.

EDITORIAL APPOINTMENTS

Managing Editor, *Journal of Financial and Quantitative Analysis,* August 2003-present.
Associate Editor: *Journal of Finance,* March 2000-June 2012.
Associate Editor: *Journal of Financial Economics*, January 2001-present.
Associate Editor*: Journal of Financial and Quantitative Analysis,* September 1999-July 2003.
Associate Editor: *Journal of Financial Markets*, October 2000-present.

CONTACT INFORMATION

Address:	David Eccles School of Business, 1655 E. Campus Center Drive, University of Utah, Salt Lake City, UT 84112-9303.
Phone:	(801) 581-8268.
Fax:	(801) 581-3956
E-Mail:	finhb@business.utah.edu.
Web Page:	http://faculty.utah.edu/u0295146/biography/index.hml

Resume of Hendrik Bessembinder

RESEARCH AND TEACHING INTERESTS

Financial Markets – including market design and trading costs, Stock Markets, Foreign Exchange Markets, Derivative Security Markets, Energy Markets, Risk Pricing, Risk Management, and International Financial Management.

PUBLICATIONS: Major Journal Articles

"Firm Characteristics and Long-run Stock Returns After Corporate Events" (with Feng Zhang), Journal of Financial Economics, forthcoming.

"Noisy Prices and Inference Regarding Returns" (with Elena Asparouhova and Ivalina Kalcheva), Journal of Finance, April 2013.

"Liquidity Biases in Asset Pricing Tests" (with Elena Asparouhova and Ivalina Kalcheva), Journal of Financial Economics, May 2010.

"Hidden Liquidity: An Analysis of Order Exposure Strategies in Automated Markets" (with Kumar Venkataraman and Marios Panayides), Journal of Financial Economics, December 2009.

"Measuring Abnormal Bond Performance" (with William Maxwell, Kathleen Kahle, and Danielle Xu), Review of Financial Studies, October 2009.

"Transparency and the Corporate Bond Market" (with William Maxwell), Journal of Economic Perspectives, Spring 2008.

"Market Transparency, Liquidity Externalities, and Institutional Trading Costs in Corporate Bonds" (with William Maxwell and Kumar Venkataraman), Journal of Financial Economics, November 2006.

"Gains From Trade Under Uncertainty: The Case of Electric Power Markets" (with Michael Lemmon), Journal of Business, July 2006.

"Does an Electronic Stock Exchange need an Upstairs Market?" (with Kumar Venkataraman), Journal of Financial Economics, June 2004.

"Quote-Based Competition and Trade Execution Costs in NYSE-Listed Stocks", Journal of Financial Economics, December 2003.

"Trade Execution Costs and Market Quality after Decimalization", Journal of Financial and Quantitative Analysis, December 2003.

"Issues in Assessing Trade Execution Costs", Journal of Financial Markets, June 2003.

"Equilibrium Pricing and Optimal Hedging in Electricity Forward Markets" (with Michael Lemmon), Journal of Finance, June 2002.

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"Tick Size, Spreads, and Liquidity: An Analysis of Nasdaq Securities Trading Near Ten Dollars", Journal of Financial Intermediation, 2000, Volume IX, Issue 3.

"Trade Execution Costs on Nasdaq and the NYSE: A Post-Reform Comparison", Journal of Financial and Quantitative Analysis, September 1999.

"Trading Costs and Volatility for Technology Stocks" (with Herb Kaufman), Financial Analysts Journal, September/October 1998.

"Market Efficiency and the Returns to Technical Analysis" (with Kalok Chan), Financial Management, Summer 1998.

"A Cross-Exchange Comparison of Execution Costs and Information Flow for NYSE-listed Stocks" (with Herb Kaufman), Journal of Financial Economics, December 1997.

"A Comparison of Trade Execution Costs for NYSE and Nasdaq-listed Stocks" (with Herb Kaufman), Journal of Financial and Quantitative Analysis, September 1997. (Abstracted in C.F.A. Digest, Spring 1998).

"The Degree of Price Resolution and Equity Trading Costs", Journal of Financial Economics, July 1997.

"An Empirical Examination of Information, Differences of Opinion, and Trading Activity" (with Paul Seguin and Kalok Chan), Journal of Financial Economics, January 1996.

"Is There a Term Structure of Futures Volatilities? Reevaluating the Samuelson Hypothesis" (with Jay Coughenour, Paul Seguin, and Margaret Smoller), Journal of Derivatives, Winter 1996. (Abstracted in C.F.A. Digest, Summer 1997).

"Mean Reversion in Equilibrium Asset Prices: Evidence from the Futures Term Structure" (with Jay Coughenour, Margaret Monroe, and Paul Seguin) Journal of Finance, March 1995. (Abstracted in C.F.A. Digest, Fall 1995).

"The Profitability of Technical Trading Rules in the Asian Stock Markets" (with Kalok Chan), Pacific-Basin Finance Journal, July 1995.

"Bid-Ask Spreads in the Interbank Foreign Exchange Markets", Journal of Financial Economics, June 1994. (reprinted in New Developments in Exchange Rate Economics, Edward Elgar Publishing, 2001)

"Return Autocorrelations Around Non-Trading Days", (with Michael Hertzel) Review of Financial Studies, 1993 (Volume 6, number 1).

"An Empirical Analysis of Risk Premia in Futures Markets", Journal of Futures Markets, September 1993.

"Price Volatility, Trading Volume, and Market Depth: Evidence from Futures Markets" (with Paul Seguin) Journal of Financial and Quantitative Analysis, March 1993.

Resume of Hendrik Bessembinder

"Futures Trading Activity and Stock Price Volatility", (with Paul Seguin) Journal of Finance, December 1992.

"Systematic Risk, Hedging Pressure, and Risk Premiums in Futures Markets" Review of Financial Studies, 1992 (Volume 5, number 4). (Reprinted in Futures Markets, Edward Elgar Publishing, Inc., 1997.)

"Time Varying Risk Premia and Forecastable Returns in Futures Markets" (with Kalok Chan) Journal of Financial Economics, October 1992.

"Forward Contracts and Firm Value: Investment Incentive and Contracting Effects" Journal of Financial and Quantitative Analysis, December 1991.

BOOK CHAPTERS

"Bid-Ask Spreads: Measuring Trade Execution Costs in Financial Markets" (with Kumar Venkataraman, in Encyclopedia of Quantitative Finance, edited by Rama Cont, John Wiley & Sons, 2010.

"Trading Costs and Return Volatility: Evidence From Exchange Listings" (with Subhrendu Rath), in Market Liquidity, edited by Greg N. Gregoriou and Francois-Serge Lhabitant, John Wiley & Sons, 2008.

"Exchange Rate Exposure and the Hedging of Currency Risk" Recent Developments in International Banking and Finance, Vol. VI, 1991.

OTHER PUBLICATIONS

"Estimating Trade Execution Costs from Public Data," Journal of Financial Transformation (invited paper), April 2005.

"Futures Price Volatility and Spot Price Stationarity" (with Jay Coughenour, Paul Seguin, and Margaret Smoller), Chicago Board of Trade Research Symposium Proceedings, Fall 1996.

WORKING PAPERS

"Introducing Daylight to Structured Credit Products" (with William Maxwell and Kumar Venkataraman)

"Market Making Obligations and Firm Value" (with Jia Hao and Kuncheng Zheng)

"Predatory or Sunshine Trading? Evidence from Crude Oil ETF Rolls" (with Al Carrion, Laura

Tuttle, and Kumar Venkataraman)

"Why Designate Market Makers? Affirmative Obligations and Market Quality" (with Jia Hao and Michael Lemmon)

"Selection Biases and Cross-Market Trading Cost Comparisons"

CONSULTING EXPERIENCE

-Goldman Sachs
-Barclays Global Investors
-New York Stock Exchange
-National Commission on Energy Policy
-United States Department of Energy
-Interactive Data Corporation
-Energy Power Research Institute
-United States Department of Justice
- Stock Market Collusion.
- Market Manipulation.

-United States Securities and Exchange Commission
- Mutual Fund Trading Practices.
- Futures Trading and Risk Assessment.

-Federal Energy Regulatory Commission.
- Energy Market Manipulation.

-United States Department of the Treasury
- Option-Based Tax Shelters.

-Commodity Futures Trading Commission
- Futures and Options Trading Strategies,
- TAS Trading and Settlement,
- Market Manipulation,
- Market Data Reporting.

-Finance Industry Regulatory Authority (FINRA)
-Attorney General of the State of New York
- Stock Market Performance Metrics.

-Attorney General of the State of California
- Bond Valuation and Trading.

-Analysis Group
- IPO Returns
- Stock Market Manipulation,
- Risk Management Strategies,
- Mutual Fund Trading Costs,
- Bond Market Trading Costs,
- Stock Market Structure.

-Cornerstone Research
- Short Selling and Stock Prices

Resume of Hendrik Bessembinder

SELECTED INVITED RESEARCH PRESENTATIONS

- 2012: HEC-Paris, EDHEC-Nice, Frontiers in Finance Conference (Alberta), University of Pittsburgh, University of Adelaide, Curtin University, Stock Exchange of Thailand, University of Notre Dame, University of Texas-Austin.

- 2011: York University, Universidad Catolica de Chile, University of Wisconsin, Utah State University, Erasmus University Liquidity Conference, University of Porto.

- 2010: University of Oregon, Utah State University, FMA Asia Conference, Nagoya University, Oxford University, Georgia State University, University of California – Riverside.

- 2009: Rutgers University, 5th Annual Central Bank Microstructure Workshop, Zurich (keynote address), New York Accounting and Finance Forum (keynote address), Asian Finance Association (keynote address), Singapore Management University, National University of Singapore.

- 2008: Tulane University, Bocconi University, Fordham University, Toulouse University, Université Paris-Dauphine/NYSE-Euronext Conference on Market Quality, University of Miami, April 2008. Georgia Tech, April 2008, Chinese University of Hong Kong, Hong Kong University of Science and Technology, March 2008.

- 2007: Georgetown University, University of Hawaii, University of British Columbia, Pacific Basin Conference on Finance, Economics, and Accounting (keynote address), University of California – Irvine, National Bureau of Economic Research (NBER) Microstructure Conference, University of Texas at Austin, Southern Methodist University, Case Western Reserve University, University of Sydney Microstructure Conference.

- 2006: Victoria University – Wellington, University of Auckland, Florida International University, National Bureau of Economic Research (NBER) Microstructure Conference, Fundacao Getulio Vargas, Pontifica Universidade Catolica, Boston College, Northern Finance Association Meetings, University of Arizona, McGill University, Barclays Global Investors.

- 2005: University of Western Ontario, Swedish Institute for Financial Research, Northern Finance Association Meetings, University of Houston, Indiana University, Brigham Young University, University of Virginia, Claremont-McKenna College.

- 2004: Vanderbilt University, Lancaster University, Brazilian Finance Association Conference, Rio de Janeiro, July 2004, Financial Market Structure Conference, Frankfurt, University of Arizona.

- 2003: American Graduate School of International Management, National Bureau of Economic Research (NBER) Microstructure Conference, Boston, University of Washington, Hebrew University, Tel Aviv University, Texas Christian University, University of Kansas, April 2003.

- 2002: NYSE Panel Discussion on SEC Rule 11Ac1-5 Market Quality Statistics, Western Finance Association Meetings, Yale – Nasdaq Market Microstructure Conference.

- 2001: NYSE Conference "Practices and Concerns of Institutional Equity Desks", National Bureau

of Economic Research (NBER) Microstructure Conference, Commodities Futures Trading Commission, University of Kentucky, Western Finance Association Meetings, University of Utah.

- 2000: University of Tennessee, University of Florida, American Finance Association Meetings.
- 1999: NYSE Conference "U.S. Equity Markets in Transition", University of Illinois, Purdue University, New York Stock Exchange Research Group, Emory University, Nasdaq-Notre Dame Microstructure Conference, Rice University, Conference on Electricity Industry Restructuring, UC Berkeley.
- 1998: Washington University, St. Louis, Instituto Technologico Autonomo De Mexico, Rice University, University of Texas at Austin, University of Notre Dame.
- 1997: University of Georgia, Cornell University, University of Rochester, U.C. Riverside, University of Alberta, American Graduate School of International Management, University of Oklahoma.
- 1996: U.C. Berkeley, University of Arizona, Ohio State University, University of Southern California, NYSE Conference "The Search for the Best Price".
- 1995: University of British Columbia, University of Washington, Arizona Finance Symposium.
- 1994: Southern Methodist University, Western Finance Association Meetings, University of Iowa, February 1994, University of Missouri, Australian Graduate School of Management, Hong Kong University of Science and Technology, University of Washington, University of Wisconsin.
- 1993: University of Michigan, University of Arizona, University of Colorado.
- 1992: Brigham Young University, UCLA, Commodity Futures Trading Commission, University of Michigan, University of Georgia.
- 1991: University of Washington, University of Arizona.
- 1990: University of Rochester, University of Utah, Western Finance Association Meetings, University of Arizona, American Finance Association Meetings.

DISCUSSIONS PROVIDED AT CONFERENCES

- Chulalongkorn University Accounting and Finance Symposium, November 2012.
- Annual Conference of The Rothschild Caesarea Center, May 2012.
- Chulalongkorn University Accounting and Finance Symposium, November 2010.
- FMA Asia Conference, July 2010.
- American Economics Association Annual Meeting, January 2010.
- American Finance Association Annual Meeting, January 2010.
- Chulalongkorn University Accounting and Finance Symposium, November 2009.
- NYSE/Euronext Conference, Amsterdam, June 2009.

Resume of Hendrik Bessembinder

- FIRS Conference, Prague, June 2009.
- Chulalongkorn University Accounting and Finance Symposium, November 2008.
- Chulalongkorn University Accounting and Finance Symposium, November 2007.
- Northern Finance Association Meetings, September 2006.
- Northern Finance Association Meetings, September 2005.
- Western Finance Association Meetings, June 2005.
- Western Finance Association Meetings, June 2004.
- CFS Market Design Conference, Eltville, Germany, June 2004.
- Morgan-Stanley Market Structure Conference, April 2004.
- Financial Management Association Meetings, October 2003.
- Western Finance Association Meetings, June 2003.
- Georgia Tech International Finance Conference, March 2001.
- Western Finance Association Meetings, June 2000.
- Western Finance Association Meetings, June 1998.
- American Finance Association Meetings, January 1998.
- Financial Management Association Meetings, October 1997.
- Western Finance Association Meetings, June 1997, (2 sessions).
- Western Finance Association Meetings, June 1996.
- American Finance Association Meetings, January 1996.
- Western Finance Association Meetings, June 1995.
- Chicago Board of Trade Research Seminar, May 1995.
- Western Finance Association Meetings, June 1994.
- American Finance Association Meetings, January 1994 (2 sessions),
- Western Finance Association Meetings, June 1993.
- Financial Management Association Meetings, October 1992.
- American Finance Association Meetings, December 1991.
- Financial Management Association Meetings, October 1991.
- Financial Management Association Meetings, October 1989.

PROFESSIONAL ACTIVITIES

Member:

- American Finance Association,
- American Economic Association,
- Western Finance Association,
- Society for Promotion of Financial Studies,
- Financial Management Association.

Reviewer for:

National Science Foundation,
Journal of Financial Economics,
Journal of Finance,
Review of Financial Studies,
Journal of Financial and Quantitative Analysis,
Journal of Business,
RAND Journal of Economics,

Resume of Hendrik Bessembinder

The Accounting Review,
Management Science,
Review of Economics and Statistics,
Review of Asset Pricing Studies,
Financial Management,
Financial Analysts Journal,
Journal of International Money and Finance,
Journal of Financial Intermediation,
Journal of Financial Markets,
Journal of Money, Credit, and Banking,
Journal of Banking and Finance,
Journal of Financial Services Research,
Journal of Economics & Management Strategy,
Journal of Empirical Finance,
Journal of Applied Econometrics,
The Energy Journal
Energy,
Pacific-Basin Finance Journal,
Journal of Comparative Economics,
The Financial Review,
Journal of Futures Markets,
International Review of Economics and Finance,
Journal of Financial Research,
Journal of Business Research,
Global Finance Journal
Latin American Business Review.

Other Conference-Related Service:

-Co Program Chair, FMA European Conference, 2011.
-Track Chair, FMA meetings, 1997, 2003.
-Reviewer, Utah Winter Finance Conference, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011.
-Reviewer, Toronto Stock Exchange Conference, 2002.
-Program Committee Member, WFA meetings, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011.
-Session Chair, AFA Meetings, 2000, 2008, 2013.
-Session Chair, WFA Meetings, 1998, 1999.
-Doctoral Consortium Panelist, FMA Meetings, 2001, 2006.
-Session Chair, FMA Meetings, 2006.
-Program Committee Member, FMA Meetings, 1993, 1996.

Other Service:

- FMA Nominating Committee, 2002
- Director: Western Finance Association, 1999-2002.

Resume of Hendrik Bessembinder

EXTERNAL PROMOTION AND TENURE REVIEWS:

-University of Illinois,
-University of Minnesota,
-University of North Carolina,
-Ohio State University,
-University of Texas at Austin (2),
-University of British Columbia (2),
-Indiana University (4),
-Vanderbilt University,
-University of Wisconsin (3),
-University of Oregon,
-Pennsylvania State University (2),
-University of Arizona,
-Hong Kong University of Science and Technology (2),
-University of Virginia,
-Virginia Tech,
-Boston College,
-National University of Singapore,
-Singapore Management University (2),
-Erasmus University,
-University of Colorado,
-Emory University (2)
-Claremont McKenna College,
-Baruch College,
-Tel Aviv University,
-Southern Methodist University,
-University of Oklahoma (3),
-Rutgers University,
-University of Hong Kong
-Texas A&M University,
-University of Alberta (2),
-University of Iowa (2),
-Tulane University,
-University of Notre Dame,
-University of Georgia (2),
-Brigham Young University (4),
-Hong Kong University of Science and Technology
-Rice University (3),
-McGill University,
-Syracuse University (3),
-University of Cincinnati,
-EDHEC Business School,
-University of Tennessee,
-Thunderbird (The American Graduate School of International Management)
-University of Western Ontario,

Resume of Hendrik Bessembinder

-George Mason University,
-University of Delaware (2),
-University of California -Riverside,
-Utah State University,
-Saint Louis University,
-Wilfrid Laurier University,
-Binghamton University (2),
-DePaul University.
-Monash University.

UNIVERSITY TEACHING

-Introduction to Corporate Finance (MBA program core, Executive MBA program),
-Investment Management (MBA program),
-International Financial Management (Executive and regular MBA programs),
-Capital Markets Seminar (PhD program),
-Futures, Options, and Derivative Securities (MBA and advanced undergraduate),
-Research Methods (PhD program),
-Advanced Corporate Finance (MBA program).

CUSTOMIZED EXECUTIVE SHORT COURSES

-Emory University Management Development Program.
-Emory University Financial Skills Program
-Lockheed Martin Corporation.
-U.S. West, Inc.
-Motorola Corporation.
-J.M. Huber Corporation.
-Asia-Pacific Center for Executive Development.
-Arizona Public Service, Inc.
-Western Area Power Administration.

DISSERTATION COMMITTEES

-Lena Lee (completed 1991, initial appointment at University of Hawaii)
-Dong Man Kim (completed 1991, initial appointment at Cal State - San Bernardino)
-Wilson Tong (completed 1992, initial appointment at Hong Kong University of Science and Technology)
-Abe Helou (completed 1993, initial appointment at College of William and Mary).
-Vaughn Armstrong (Chair, completed 1995, initial appointment at Washington State University).
-Jay Coughenour (Chair, completed 1995, initial appointment at University of Massachusetts).
-Mark Chockalingam (completed 1995, initial appointment at Federal Express Corporation).
-Dan Deli (completed 1996, initial appointment at University of Delaware).
-Karyn Williams (Chair, completed 1999, initial appointment at Claremont Graduate School).
-Jim Linck, (completed 1999, initial appointment at University of Rochester).
-Vincentu Covrig (completed 1999, initial appointment at National University of Singapore).
-Kumar Venkataraman (Chair, completed 1999, initial appointment at Southern Methodist

University.)
-Chris Gadarowski (completed 2000, initial appointment at Cornell University).
-Ryan Whitby (completed 2007, initial appointment at Texas Tech University).
-Jim Turner (completed, 2007, initial appointment at Weber State University).
-Ivalina Kalcheva (Chair, completed 2007, initial appointment at University of Arizona).
-Jia Hao (Chair, completed, 2007, initial appointment at Wayne State University).
-Yung-Yu Ma (completed, 2009, initial appointment at Lehigh University).
- Shagun Pant (completed, 2009), initial appointment at Texas A&M University).
- Allen Carrion (Co-chair, completed 2012, initial appointment at Lehigh University).
- Huan Cai (completed, 2012).

HONORS AND AWARDS

-Research Grants, New York Stock Exchange, 1995, 1996, 1998, 1999, 2000, 2001, 2002.
-Competitive Research Award and Grant, Pacific Basin Capital Markets Research Center, Summer 1994.
-Faculty Research Development Award, Summer 1992, ASU College of Business,
-Faculty Grant-In-Aid Research award, ASU, Summer 1991,
-MBA Superior Teaching Award, Simon School of Business, University of Rochester, 1989,
-Albert Foster Dissertation Fellowship, University of Washington, 1985.

INSTITUTIONAL SERVICE:

UNIVERSITY OF UTAH

Senior Vice President Search Committee, 2012.
University Endowment Investment Advisory Committee, 2006-
DESB Dean Search Committee, 2008-09.
University Retirement Vendor Selection Committee, 2005-2006.
DESB Ad Hoc Committee on Promotion and Tenure Standards, 2005-06.
DESB Promotion and Tenure Committee, 2007-08 (chair), 2009-10.
Faculty President, Eccles Business School, 2003-04.
College Council, Eccles Business School, 2002- 04.
Faculty Vice President, Eccles Business School, 2002-2003.
Director, Garn Institute of Finance, 2003-2004.
DESB Masters Program Committee, 2002-03, 2008-09.
Finance Department Recruiting Chair, 2002-03, 2005-06, 2009-10.
University Annuities and Salaries Committee, 2002-2005 terms.
University Budget and Planning Committee, 2005-2009 terms.
Faculty Grant Proposal Reviewer, 2004.

GOIZUETA BUSINESS SCHOOL, EMORY UNIVERSITY

College Personnel Committee, 1999, 2000.
PhD Program Planning Committee, 1999, 2000.
MBA Program Committee, 1999, 2000.
Evening MBA Strategic Planning Committee, 2000.

Resume of Hendrik Bessembinder

ARIZONA STATE UNIVERISTY

Department Recruiting Committee: 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997,1998.
Department Ph.D. Program Committee: 1989, 1990, 1991, 1992(chair), 1993(chair), 1994(chair), 1995(chair), 1996, 1997, 1998.
Department Research Committee: 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997,1998.
Department Computing Resources Committee: 1989, 1990(chair), 1991(chair), 1992(chair), 1993(chair), 1994(chair), 1995(chair), 1996(chair), 1997 (chair), 1998.
Department Self Study Committee: 1994.
Department Chair Evaluation Committee: 1994,1997.
Department Personnel Committee: 1994, 1995, 1996(chair), 1998.
Department Ad Hoc Committee on Post-Tenure Review: 1997 (chair).
College Faculty Council, 1997.
College Ad Hoc Committee on Implementation of Post-Tenure Review, 1997.
College Computing Resources Committee: 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997.
College Ph.D. Program Committee: 1992, 1993, 1994, 1995.
College Research Committee: 1993.
College Business Partners Faculty Development Task Force: 1992.
College Ad Hoc Committee on International Business: 1993.
University Faculty Computing Advisory Committee: 1992.
University Multidisciplinary Initiatives Committee: 1994.

Last Updated: March 15, 2013

Appendix B:

Depositions and Testimony provided by Hendrik Bessembinder

I. Depositions Given:

- Morton L. Topfer, et al., plaintiffs, v. Quellos Custom Strategies LLC, et al., Defendants, Cause No. D-1-GN-08-003638, in the District Court, Travis County, Texas. Deposition Date: September 29, 2010.

- In Re. Initial Public Offerings Securities Litigation, Master File No. 21 MC 92 (SAS), United States District Court, Southern District of New York. Deposition Date: March 20, 2008.

- Tom Gonzales, as Personal Representative of the Estate of Thomas J. Gonzales II, Plaintiffs, v. Franchise Tax Board, an Agency of the State of California, Defendant, in the Superior Court of the County of San Francisco, California, No. CGC-06-454297. Deposition Date: January 21, 2008.

- United States Commodity Futures Trading Commission, plaintiff, vs. Jeffrey A. Bradley and Robert L. Martin, defendants, Case No. 05-CV-62-JHP-FHM, Northern District of Oklahoma. Deposition Date: May 24, 2006.

- Official Employment-Related Issues Committee of Enron Corp., et al., plaintiff, vs. John Arnold, et al., defendants, Case No. 01-16034-AJG, Southern District of New York, Adversary No. 03-3522. Deposition Date: June 17, 2005.

- Internet Law Library, Inc., et al. Plaintiffs, vs. Southridge Capital Management LLC, et al., Southern District of New York, (01-CV-6600). Deposition Date: June 23, 2003.

II. Testimony Provided:

- David B. Greenberg, et al., Petitioner, v. Commissioner of Internal Revenue, Respondent, United States Tax Court, Docket No. 1143-05 etc. Testimony Date: February 14, 2011.

- Palm Canyon X Investments, LLC, AH Investments Holdings, Inc., Tax Matters Partner, Petitioner, v. Commissioner of Internal Revenue, Respondent, United States Tax Court, Docket No. 5610-06. Testimony Date: August 16, 2007.

- Official Employment-Related Issues Committee of Enron Corp., et al., plaintiff, vs. John Arnold, et al., defendants, Case No. 01-16034-AJG, Southern District of New York, Adversary No. 03-3522. Testimony Date: August 15, 2005.

- United States of America before the Commodity Futures Trading Commission, in the Matter of Anthony J. DiPlacido, respondent, CFTC Docket No. 01-23. Testimony Date: December 3, 2003.